

The 'learning to learn competence' from the Health Sciences perspective. A qualitative validation study

The 'LTL' competence in Health Sciences. A qualitative validation study

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Abstract

Abstract Background 'Learning to learn' (LTL) is a key competence proposed to education systems by the European Commission (EC, 2005). To date, no agreement on LTL has yet been reached by scholars to establish the required theoretical model to incorporate this competence into curricula. Our research team aimed to design and validate an integral model to use it as a reference. This model consisted of five dimensions; cognitive, metacognitive, affective-motivational, social-relational and ethical; and 20 subdimensions. The first three dimensions came from strategic and self-regulated learning, the fourth from the socio-cognitive approach and the fifth was an original contribution. Students, teachers, professionals and employers from Health Sciences were inquired to validate this model. Methods To do so, qualitative methods were used by developing four focus groups (n=20). The participants were asked a general question about LTL and their discussion was recorded. Later these tapes were transcribed and processed with Atlas ti.8. to compare the coded contents with the theoretical model. The presence and relevance of the initial model's dimensions and subdimensions were analyzed by considering comment frequency, connection and interrelationship. Results The results confirmed the initial model: the participants highlighted all the dimensions and almost all the subdimensions. Conclusions A future research line would be to devise a standardized assessment instrument for university students based on this theoretical model. Limitations and implications for practice are discussed

Background

In the scientific literature, the 'learning to learn' (LTL) concept has gradually acquired more relevance thanks to the various research lines conducted since the 1970s and 1980s. In the European Union, this concept has resulted in 'the learning to learn competence'.

The theoretical basis of this competence comes mainly from two research lines found in the scientific literature: the 'Strategic Learning' (SL) construct (Danserau, 1985; Weinstein, 1988) and the 'Self-Regulated Learning' (SRL) construct (Bandura, 1986; Boekaerts, 2006; Panadero, 2017; Pintrich, 2004; Zimmerman, 1986 and 2002). Both emphasize students' active participation in their own learning process by managing this process. The first of these two lines is backed by cognitive theory (information-processing theory), while the second is backed by socio-cognitive theory (Thoutenhoofd, and Pirrie, 2015).

Based on former research and its relevance, the European Commission (EC) included LTL as one of the key competences for the education systems of EU member countries (EC, 2005). The LTL competence was understood to integrate cognitive, affective, metacognitive and socio-relational dimensions, including motivation, confidence and skill to persist in learning. It involved the following: being well organized, managing time and information properly, handling skills to learn well and to acquire new knowledge and capacities, being aware of one's own learning process, making the most of opportunities, overcoming difficulties, and being able to work well in groups. It also included the capacity to apply what has been learnt in one's own private and professional life.

In 2018, the EC reformulated this competence, and it became known as the 'personal, social and learning competence' (EC, 2018), which coincides considerably with the 2005 formulation. However, as it explicitly includes the socio-personal domains, important additions are included that refer to empathy and conflict management, resilience, the skill to manage uncertainty and stress, feeling sure about oneself, and taking a positive attitude to socio-personal and physical well-being. Emphasis is placed on teamwork, a collaborative attitude and negotiation. Critical thinking and the importance of lifelong learning are insisted. References are also made to the importance of integrity and to the need to develop a problem-solving-type attitude.

Effectively acquiring this competence is, thus, fundamental for adapting to changes in knowledge society (Säfström, 2018), facing the challenge of employability and for students' own socio-personal development. Students' work is understood as an autonomous exercise, particularly in Higher Education, and is supported by the learning to learn philosophy (Martínez and Moreno, 2007): university students need to be more independent and more competent, like adult apprentices, in the process of managing their own learning than students learning lower levels of education.

Given the importance of this matter and as it is currently being incorporated into education systems, having a theoretical model that has been agreed on and endorsed by the scientific community based on this competence is necessary (Jornet Meliá, García-Bellido and González-Such, 2012). This incorporation without such a theoretical model seems very hard, and even impossible.

In Europe, relevant works have been conducted, like those by Hautamäki et al. (2002) from the Centre for Educational Assessment of the University of Helsinki. These researchers defined this competence and set certain dimensions and subdimensions to build an evaluation framework. There is also the work by Hoskins and Fredriksson (2008), who led the work by the European CRELL network (Centre for Research on Education and Lifelong Learning, EC) by coordinating several teams of researchers from EU countries in an attempt to reach a consensus about a theoretical model and an evaluation protocol. An evaluation instrument was designed with three main dimensions: cognitive, metacognitive and affective. However, its outcomes did not satisfy the researchers. Finally, no consensus was reached about a common European indicator of the LTL competence. Hence this matter remains open.

It is worth mentioning the work of Stringher (2014). She is an Italian researcher and CRELL member who conducted a large meta-analysis study in an attempt to provide an integrative definition and model.

In this context, the work by our research group makes sense: the LTL competence theme is a complex one that does not come over clearly enough as far as its theoretical construct or its evaluation is concerned. What comes over even less clearly is how it has been worked on in the university context, which is what interests us. This is why we attempted to design a solid theoretical model, built from studying the available scientific literature to act as a reference for the research work we are conducting. Our research is based on different milestones. We herein consider comparing this model with the views of a list of key informants in the Health Sciences area by firstly performing a qualitative approach to validate it. This would progressively adapt the designed model, which would allow its dimensions, subdimensions and

components to be specified, and to make methodological proposals to teach and evaluate this competence in university degrees.

The intention is for this model to be useful for European education systems in not only Primary and Secondary Education, but also University Education. Although it is assumed that university students must be able to sufficiently manage this competence before starting Higher Education, this assumption is apparently uncertain, especially in their first years at university when they need to gain LTL skills (Trautwein and Bosse, 2017; Wibrowski, Matthews and Kitsantas, 2016).

The working group (WG) 2012-2015 for Bologna Process tackling recommended cooperation between employers and education institutions. This gives four key actors engaged in LTL: students, professors, employers and employees. Their viewpoints were considered for this work.

The teaching area of Health Sciences is sensitive about such matters, and there are plenty of research works about competence-based teaching and evaluations (Blissett et al., 2018; Harendzam et al., 2019; Jayaweera et al., 2018; Morcke, Dornan and Eika., 2015; Nasser, Saad and Karaoui, 2016; Oudkerk et al., 2018; Prediger et al., 2019; Yigzaw et al., 2015), learner-centered education methods (Barbosa et al., 2018; Ferrer-Torregrosa et al., 2016; Jacobs et al., 2016; Lee & Kim, 2018; Manyama et al., 2016; Versteeg et al., 2019), and also about self-regulated learning, which involves the students reflecting about the learning process itself with a view to improve it (Cho et al., 2017a, b; Landkveld et al., 2019; Lucieer et al., 2017)

The above-cited works, among others, reflect a clear interest in learning-centred teaching, in quality of learning and in students developing self-reflection and self-regulation skills. All this is closely connected to LTL. According to this reality, the explicit inclusion of teaching and evaluating LTL in the curricula of university Health Sciences degrees is evidently necessary.

A theoretical model on LTL

In order to provide the curricular design of this competence and to develop it in university degrees, building a good model on LTL that specifies its domain is essential to reach an operational definition of LTL (Jornet Meliá et al., 2012). This has to be done by integrating its components, recognized as being basic in the scientific community. Only by doing so is it possible to rigorously face teaching and evaluating it in university degree studies.

To conduct this work, a thorough literature review was carried out (including, among others: Deakin Crick, 2007; Deakin et al., 2006; Deakin Crick et al., 2013; García Bellido, Jornet and González-Such, 2012; Jornet Meliá et al., 2012; Hautamäki et al., 2002; Hoskins and Fredriksson, 2008; Martín and Moreno, 2007; Muñoz-San Roque et al., 2016; Stringher, 2014; Thoutenhoofd and Pirrie, 2013; Villardón-Gallego et al.,

2013; Weinstein, 1988; Weinstein, Husman and Dierking, 2002; Yáñez and Villardón-Gallego, 2015; Yip, 2012).

By a text analysis, the model was arranged into three dimensions: cognitive, metacognitive and affective-motivational (Hoskins & Fredriksson, 2008; Stringher, 2014; Weinstein et al., 2002; Yip, 2012). These three dimensions clearly appear in the theory about SL and SRL, which lay the foundations for formulating the LTL competence.

A fourth dimension needs to be included, a social-relational one, which comes from the socio-cognitive approach – situated cognition – (Thoutenhoofd and Pirrie, 2013), and includes the relevance of learning with other subjects.

Up to this point, our proposal is coherent with the literature on this theme. Nonetheless, this research team defends the notion that a competence model has to be more demanding by including a fifth dimension, ethics, which was not contemplated in the models we analyzed. A competent apprentice, who has 'learnt to learn', cannot underestimate the ethical components involved in learning, which includes those that refer to the ethics in the learning process and the ethics in the process of using what has been learnt for one's own and others' improvement.

Therefore, the model that we propose encompasses contributions from the two main theories about LTL: cognitive psychology (information-processing theory) and the socio-cognitive approach (self-regulated learning). Importance is attached to social aspects, and ethical aspects are included in an attempt to perform the most comprehensive formulation possible of this competence so that it serves for lifelong learning.

The EU is sensitive about this perspective when including references about social dimension and ethics in the 2018 text by referring to certain values like integrity, respecting others, etc.

The definition of the competence that we put forward is:

'Learning to learn implies the capacity to organize and regulate one's own learning in a way that becomes increasingly more efficient and autonomous, according to the objectives, the context and requirements. This competence allows new knowledge, skills and attitudes to be acquired, and to solve problems, by skillfully applying solutions in different personal and professional contexts, and either individually or in groups. It entails being capable of learning with others and cooperating efficiently to perform joint tasks. It also involves being aware of one's own skills and limitations, the capacity to efficiently plan one's own learning tasks, and efficaciously handling the necessary resources, techniques, skills and learning strategies. It also implies the capacity to self-assess and self-regulate one's own performance in both cognitive and affective terms by optimizing the capacities to overcome obstacles and limitations. It also entails having intellectual curiosity, intrinsic motivation and interest in facing difficulties and successfully overcoming them by maintaining ethical commitment and taking a positive attitude toward learning.'

Figure 1 and Tables 1-5 include the description of the LTL competence: Figure 1 represents the proposed dimensions (D) and offers their description. Tables 1-5 include the subdimensions (S) of each dimension (22 in total), as well as the components (Comp) of each dimension (49 in total).

In line with these assumptions, the objective of this work was to compare the competence model designed by the research team with the views of different key agents/informants from the Health Sciences area involved in this process.

Methods

Design

The employed design was of a qualitative kind, with incidental non-probabilistic sampling used to analyze 'in-depth' the visions of four groups of key informants related to Health Sciences in Higher Education in. We employed the focus group technique to collect relevant information about the matter under study (Fullana et al., 2016). The focus group technique consists of a number of planned series of discussions about an interesting topic that allows the perceptions of key informants in a specific area in a permissive environment to be collected (Krueger and Casey, 2009). We then used a content analysis to process data, which allowed the systematic study and description of the communication content by organizing the text into categories based on explicit coding rules (Elo and Kyngäs, 2008; Krippendorff, 1980, 1989; Mayring, 2000; Neuendorf, 2017; Saldaña, 2013; Stemler, 2001).

The study object included the beliefs, perceptions and meanings that several key informants involved in the process contributed.

Four discussion groups were organized for this purpose, and each one was held with the groups detailed in the next section, and came from the Health Sciences area. We were interested in the perspective of the key informants from this area in relation to the LTL competence and how it is dealt with at university.

Participants

The sample foreseen by the research team was formed by conducting intentional or convenience sampling.

Four groups of key informants from the Bologna WGs were identified: students, teachers, employers and employees. Teachers and professors came from the Universidad de Valencia Estudi General (UVEG), the most important and oldest university in the region with a long-standing tradition of Health Sciences studies. Both the employers and employees worked in reference public hospitals in the region, which were

two university hospitals. A selection was made and 20 participants were included. The following criteria were considered for the selection:

- The participants belonged to the Health Sciences knowledge area
- The employers were managers in the Human Resources departments of hospitals
- The professors had more than 20 years experience in, and manifested commitment with LTL
- The students had an average mark ≥ 8.5 out of 10 points in their academic records
- The employees were postgraduates and also had manifested commitment with LTL

The participants were identified in their working centers. First, we contacted the reference centres in Valencia, University Faculties and Hospitals for access reasons. They provided us with some names until we had obtained enough subjects. To identify students and teachers, we used the GIPU-EA contact networks.

The end sample was like that shown in Table 6.

Table 6 approximately here

There were two female employers: the General Submanager and the Head of Nursing from a large public hospital, which is a reference hospital in the region of Valencia (Spain).

There were six employees: a female supervisor nurse from Neurology in a public hospital in the city of Valencia; a male nurse from the same hospital; a male physiotherapist from another public hospital in Valencia; a female physiotherapist from the same hospital; a female Pharmacology researcher; a female Pathology researcher.

There were six professors: two male professors from the Medical School; two female professors from the Physiotherapy School, and two other (one male and one female) from the School of Nursing. They were all from the Universidad de Valencia.

There were six students: two male grade 6 Medicine students; two female grade 4 Physiotherapy students; two Nursing grade 4 students, one male and one female.

Instruments

The researcher team designed an action protocol for those leading the discussion groups. This protocol included a brief explanation about the purposes of these meetings to be read during the session. Then it included an affirmation and a question, as follows:

“Any individual and any professional need to continue learning to improve, and also need to adapt and perform their tasks efficiently in a quickly changing socio-economic and cultural context. In this context, the EU considers that one of the basic competences that students must acquire in the education system is ‘learning to learn’ given the lifelong learning need.

From this point of view, and as ‘learning to learn’ is related with this need to keep learning, what qualities, capacities, skills, etc., must someone acquire or perfect while studying a degree at university to become a responsible competent professional?”

Procedure

The research team designed a theoretical model of the competence (included in a previous section). This model was judged by experts, who evaluated the suitability of its dimensions, subdimensions and components. With these experts’ evaluation, the research team made the necessary adjustments to the model. Its structure is found in Figure 1 and Tables 1-5.

Next, focus groups were used and interventions were recorded. Those who participated in the groups were invited to a face-to-face session by the researchers to run the focus groups. Groups were led by at least two research team members who were sufficiently experienced in leading focus groups. Attempts were made to maintain a relaxed atmosphere so that the participants could feel freely able to express themselves. Group leaders did not make any evaluation-type remarks. Leaders merely welcomed the participants, greeted them, introduced the theme with the aforementioned texts and intervened if they considered it necessary because someone had a doubt that needed explaining, because they were asked to intervene or because participation was not as expected. In all cases, their involvement was never intended to be influential. The focus groups lasted 45-50 minutes.

Those who participated in these groups gave verbal approval to the researchers to use the information in possible future publications, always respecting the privacy and anonymity of the participants.

Recordings were transcribed and the obtained texts were submitted to a content analysis by following an inductive-deductive procedure to study discourse, and to also code and establish categories. On the one hand, work began with the analysis categories prepared by the research team which were present in the model being tested –a deductive procedure– (Elo & Kyngäs, 2008; Hsieh & Shannon, 2005; Polit & Beck, 2004). On the other hand, work was done with an open mind when coding fragments of text to create new categories, if necessary, as they were not included in the theoretical model being tested –an inductive procedure– (Elo & Kyngäs, 2008; Hsieh & Shannon, 2005).

The tested categories were the model’s subdimensions (n=22) and its components (n=49) (Tables 1-5). By data processing, these categories were completed and enriched by employing the contributions made

by the key informants. In this work, the intention was for categories to be homogeneous, thorough, exclusive and sufficiently objective or relevant. Having defined the categories, the text study was carried out, the participants' contributions were coded and the frequency of contributions shown in the various categories was limited. This work was done by a series of judges trained specifically for this purpose: n=4 research team members. For the analysis, version 8 of Atlas.ti was used (Friese, 2019; Zhang and Wildemuth, 2009), and special attention was paid to the triangulation process among the various sources in each case (Renz, Carrington and Badger, 2018).

Data processing consisted in two interdependent stages. Text work was first done with raw data by indicating segments to code them according to a list of codes based on preset analysis categories. Any significant fragments of text were taken from the remarks made by the participants, which were compared with the components of the model's established subdimensions to determine if all these fragments of text fitted these established components and subdimensions. Next codes were conceptually linked using the discourse elements and the theoretical model to create a map of the relations among elements to corroborate, refute and complement the initial theoretical model. All this allowed conceptual networks to be created by taking the dimensions foreseen in the model as the central categories or families: Cognitive (D1), Metacognitive (D2), Affective-Motivational (D3), Social-Relational (D4) and Ethical (D5). To establish the secondary nodes, the model's subdimensions were used by generating groups with codes labeled 'S1', 'S2', etc., and their respective denomination (Figures 2-5). To establish the tertiary nodes, the components of these subdimensions were employed, which were labeled 'Comp1', 'Comp2', and so forth.

Results

Figures 2-6 present the obtained results. Figure 2 offers the results by grouping the four held discussion groups, thus the results were obtained from the 20 subjects who participated in the groups. The other figures correspond to all four groups.

These figures collect the model's five dimensions, its subdimensions and the components of these subdimensions based on the remarks made by the participants in the groups, and with the denominations indicated in the previous section.

Alongside each component come the frequencies found in the groups, which are preceded by the graphs in gray and by two letters that go before the response frequency, where G=Groundedness; that is, the response frequency or, if preferred, the number of times that a remark made by the participants appears in the text that is coherent with the corresponding description; D=Density; that is, the times that the participants established relations with the corresponding remark and the others mentioned in the group, and the times that it interacted with other codes. Both data are relevant because a statement or remark upheld by many participants is not as equally important as that upheld by one subject. Density is another relevant parameter to analyze the relations that the participants established in the discourse.

Participants' testimonials are combined in the presentation of the results, cited in accordance with the Primary Document (PD) that they refer to: PD1 (students), PD2 (professionals), PD3 (employers) and PD4 (teachers). In these literal testimonials, the identifier that Atlas.ti.8 provides is indicated after the Primary Document, preceded by a colon (:).

Most subdimensions were clearly reflected in the discourse and, as shown in the figure, the researchers grouped and associated them with the dimensions that made them up. It is necessary to clarify that both subdimensions and dimensions were the research team's theoretical elaborations, which were included in the model being tested, while the remarks related with their components were contributions made by the participants in the discussion groups and referred to the variables included in the theoretical model.

The results were presented in this order:

First, the overall results were analyzed. They were obtained by grouping the results of the four discussion groups to form an overview of the Health Sciences area (Figure 2):

The Groundedness (G) and Density (D) data are presented. The D data included the interdimensional relations that the participants established among the five dimensions, which allowed connections to be analyzed. Next all the dimensions were analyzed in detail, and their relevance and the intradimensional relations that the participants referred to in their interventions were discussed, which endorsed the coherence of each dimension.

Second, the results between the four groups were compared in order to assess the differences that might appear between them (Figures 3-6).

Rooting and interdimensional relations

Regarding the number of references and, therefore, the importance attached to the dimensions, the Cognitive dimension presented the highest Groundedness ($G=28$)¹, followed by Social ($G=27$), Metacognitive ($G=19$), Affective/Motivational ($G= 18$), and finally by Ethical dimension ($G=13$). Table 7 presents the Groundedness data for the dimensions, subdimensions and components.

Table 7 approximately here

The five dimensions were interrelated, which supports the model's coherence. Table 8 presents the interdimensional relations data for the dimensions and subdimensions (Density). The relations between the Cognitive and Metacognitive dimensions were more evident: the subdimension 'Effective information management' (S1/Comp1) ² was related to 'Knowing oneself...' (S7/Comp19): "[...] the technique used to learn serves each one and you learn it from experience, and you know if something you do is better or not [...]" (PD1:22). They also connected S1 and 'Self-assessment, control, self-regulation' (S9/Comp22): "[...] is the self-criticism capacity to be capable of seeing your own mistakes, how you can improve them, what you could have done instead, and you develop in this way" (PD1:12).

Table 8 approximately here

The 'Critical and creative thinking' (S6/Comp13 and Comp14) and 'Problem-solving' (S10/Comp24) subdimensions were related: "Something positive comes from your mistakes, which you sometimes don't focus on; and it is very important to learn from your mistakes [...], know what your mistakes are and to learn from them [...] what they have impressed on us in nursing [...] foreseeing things [...] preparing for what might come; this is something we don't master, [...] we go our own way a bit... let's say we do not strictly stick to what you think might be right... [...] we are treated as students, but not as professionals, nor as future professionals" (PD1:40).

The Cognitive dimension was associated with the Affective-Motivational dimension: 'Oral communication skills' (S2/Comp3) were related to 'Internal attributions' (S12/Comp29): "[...] speaking in public [...] still lacks confidence and needs to receive it [...] it is necessary to somewhat promote everyone continuing to work on this and so you gain confidence" (PD2:33).

The Metacognitive dimension was related with the Social-Relational one: the participants related 'Planning, organization and management of time' (S8/Comp21) and 'Self-assessment, self-control and self-regulation' (S9/Comp22) to 'Social values' (S16/Comp36): "People come to pass and they often have no connections with [...] older doctors or older biologists [...]. Relationships and shared values are fundamental. They do not have enough time, which is a problem [...] a 4-monthly period has as many subjects and as much material as I previously had in 1 year. You must plan. This is not feasible and they do not connect in the end; this is a problem [...] They really want to study, wish to learn [...] The problem lies in the amount of material in a 4-monthly period [...] what you have to do is to train them" (PD3:12).

The Affective-Motivational dimension, apart from being related to the cognitive dimension, as mentioned earlier, is related to the Social dimension (the participants related 'Internal attributions' (S12/Comp29) to 'Teamwork' (S18/Comp42): "[...] efforts must be made to help young people to learn and be an example [...] it is important that we all get to know one another more, that we like each other more, that we appreciate what we have more and the things that make us happy, and do not let them make us feel so

frustrated” (PD2:40). ‘Motivation and a positive attitude toward learning and improvement’ (S11/Comp25) was also associated with ‘Teamwork’ (S18/Comp41): “[...] this is what really helps you make progress in a career: wanting to learn [...] from our classmates [...] from the people we deal with [...] they seem grateful for what you’ve learnt and for what you’re offering them” (PD1:13).

The Ethical and Social/Relational dimensions were also related to one another: the participants’ remarks connected ‘Attitudes toward cooperation and solidarity; relationships’ (S17/Comp40) and ‘Civic and moral attitudes and values’ (S21/Comp47), and also ‘Respect for deontological codes’ (S22/Comp49): “[...] being responsible for their mistakes as there is a [...] tendency to blame others [...] this is one of the main failure situations in work groups” (PD2:26). Finally, ‘Attitudes toward cooperation and solidarity; relationships’ (S17/Comp38) and ‘Responsibility in learning’ (S20/Comp45) were related: “[...] I don’t have to be angry with a medical classmate, nor with the specialist. If I tell you: ‘Go ahead and value it’; I don’t care if its 3 in the morning because you’re on call to do that. That’s your work” (PD3:29).

Dimensions and intradimensional relations

Table 9 presents the data of the intradimensional relations for the dimensions and subdimensions (Density).

Cognitive dimension

The subdimension which the participants made most remarks about was S1, ‘Effective information management’ (G=12), and the components they mentioned were ‘Learning transfer’ (Comp2) (G=7) and ‘Searching, selecting and managing information’ (Comp1) (G=5).

The S2 subdimension came next, ‘Oral communication skills’ (G=7), and referred to ‘Efficient Communication’ (Comp3) (G=5), and ‘Adapting to the context and audience’ (Comp6, G=2) .

Subdimension S6, ‘Critical and creative thinking’ displayed the same frequency (G=7), which referred to remarks about ‘Analysis, inferences and critical reasoning’ (Comp13) (G=4), ‘Questioning underlying assumptions’ (Comp14) (G=2) and ‘Personal creative proposals’ (Comp12) (G=1).

Finally came subdimension S3, ‘Written communication skills’ (G=2), with remarks about ‘Efficient communication (Comp7)’ (G=1) and ‘Writing rigorous texts of scientific and technical quality’ (Comp9) (G=1).

No remark was made about 'ICT Management' (S5) or about 'Knowledge and use of non verbal languages' (S4), although these subdimensions were present in the model being tested.

Intradimensional relations also appeared. In S2, 'Oral communication skills' and 'Effective oral communication' (Comp3) were related to 'Adapting to the context and audience' (Comp6), and stressed communication with patients "[...] it is very important to inform about what they're doing to them. [...] by informing them properly [...] patients understand what they're doing [...] it's not the same thing informing the person working on your shift as informing the patient" (PD1:46). In subdimension S3, 'Written communication skills' was linked with 'Effective written communication' (Comp7) and with 'Writing rigorous texts' (Comp9), and it was emphasized that "[...] you might have excellent theoretical knowledge, but it is no good [...] if you don't know how to communicate" (PD1:28).

An association was also found with the three components of subdimension 'Critical and creative thinking': 'Creative personal proposals' (Comp12) was related to 'Conducting differentiated analysis, inferences and critical reasoning' (Comp13), and also to 'Challenging the assumptions underlying the usual ways of thinking and acting' (Comp14): "[...] critical capacity [...] being able to discern between what is positive and what is negative [...] students can no longer act as passive elements, but as active elements, and build their own learning" (PD4:3).

Metacognitive dimension

The subdimension that most remarks were made about was S10, 'Problem solving' (G=11), followed by S7, 'Knowing oneself, the task and strategies' (G=4), and the mentioned components were 'Questioning learning objectives and formulating one's own objectives' (Comp18) (G=3) and 'Making decisions related to what and how to learn' (Comp 19) (G=1). Some remarks were also made about S8, 'Planning, organization and management of time' (G=2) and S9, 'Self-assessment, self-control and self-regulation' (G=2).

Intradimensional relations also appeared: in S7, 'Knowing oneself': 'Questioning learning objectives' (Comp18) was related to 'Making decisions related to what and how to learn' (Comp 19): "[...] if you teach and lead a student in this direction theoretically, the student goes in that direction [...] what you must teach a student is: 'seek your directions according to your own skills because everyone is different' [...] let them act" (PD3:25). In S8, 'Planning, organization and management of time', 'Planning well tasks' (Comp20) was related to 'Prioritizing, organizing and carrying out the required activities' Comp 21): "[...] make the best of your time [...] I used to go to class [...] when exams were coming up, but not to the theory classes because I made better use of my time visiting the library [...] it's a point to evaluate" (PD1:32). 'Analyzing, evaluating and monitoring' (Comp22 of S9) was also related to 'Questioning learning objectives' (Comp18 of S7): "[...] major shortcomings [...] when self-criticizing or how to find a solution for

a given problem [...] they need a supervisor [...] they have no independence when working [...] they have to self-criticize the work they do in the lab” (PD3:9).

Affective-Motivational dimension

The subdimension that most remarks were made about was S11, ‘Motivation and positive attitude toward learning and improvement’ (G=8), and they all referred to ‘Improving and maintaining motivation, curiosity, interest...’ (Comp25). It was followed by S13, ‘Self-concept, self-esteem and self-efficacy’ (G=5), and remarks referred to ‘Having an adjusted image of oneself...’ (Comp30) (G=4) and ‘Increasing self-efficacy...’ (Comp 31) (G=1). Then came S15, ‘Emotional self-regulation and control of anxiety’ (G=2), and all the remarks were about ‘Controlling anxiety’ (Comp35). The last subdimension was S12, ‘Internal attributions’ (G=1).

The participants made no remarks about the ‘Physical and emotional well-being’ (S14) present in the model being evaluated.

Intradimensional relations appeared between ‘Improving and maintaining motivation, curiosity, interest...’ (Comp25 of S11) and ‘Having an adjusted image of oneself, accepting and appreciating oneself ...’ (Comp30 of S13), and also with ‘Attributing learning outcomes and performance to one's own effort ...’ (Comp 29 of S12), which denote the coherence of the affective dimension: “[...] because when you are aware of your mistakes, you place pressure on wanting to know more. Not negative pressure, but positive pressure [...] which is what really allows you to make progress in your career: wanting to learn. But not the learning they impose, wanting to learn because you really wish to; because you want to be better in what you do” (PD1:13).

Social-Relational dimension

The subdimension about which the most remarks were made was S17, ‘Attitudes toward cooperation and solidarity...’ (G=15). Remarks referred to ‘Negotiating, sharing, arguing ... developing adequate social skills ...’ (Comp40, G=12) and ‘Effective peer cooperation for problem solving ...’ (Comp38, G=3).

It was followed by S19, Teamwork (G=7): remarks were about ‘Active participation in working groups...’ (Comp42, G=6) and ‘Carrying out the tasks by sharing objectives and interests...’ (Comp41, G=1).

The subdimension about which the fewest remarks were made was S16, ‘Social Values’ (G=5). Here remarks referred to ‘Valuing interpersonal relationships and working with others...’ (Comp36, G=3) and to

'Working, studying and striving to contribute to society...' (Comp37, G=2).

The participants did not remark about 'Control of environmental conditions' (S19) that the model contemplated.

Intradimensional relations were observed in subdimension S17, 'Attitudes toward cooperation and solidarity; relationships' between 'Effective peer cooperation for problem solving...' (Comp38) and 'Negotiating, sharing, arguing ... developing adequate social skills ...' (Comp40): "[...] this is a highly individualistic profession [...] I was never taught teamwork, nor [...] to communicate with patients, nor [...] to handle difficult situations in relation to communication, [...] they are very important matters" (DP2:10). An association was found between 'Active participation in working group...' (Comp42 of S18) and 'Effective peer cooperation for problem solving...' (Comp38 of S17): "[...] we face many difficulties [...] when dealing with a patient diagnosed a disease [...] among the different specialties [...] there is neither communication [...] nor integration when teams are working. This is fundamental" (PD2:6). A relation was detected in S18, 'Teamwork' between 'Carrying out the tasks by sharing objectives and interests ...' (Comp41) and 'Active participation in working group...' (Comp42): "[...] better teamwork; shouldering a responsibility, not just your own, and of your actions, but of the group in which we will work in a multidisciplinary environment, with both nursing and medicine, and ... physiotherapy or rehabilitation" (PD1:11). All these relations backed the coherence of the dimension.

Ethical dimension

The most frequently mentioned subdimension was S21, 'Civic and moral attitudes and values' (G=9). Remarks were about 'Being honest, responsible, respectful of others and truthful...' (Comp47, G=6) and 'Working for both one's own good and the common good...' (Comp48, G=3).

This was followed by S20, 'Responsibility in learning' (G=3) and S22, 'Respect for deontological codes' (G=1).

Intradimensional relations were found to link 'Incorporating the ethical and deontological codes...' (Comp49 of S22), 'Being honest, responsible, respectful of others and truthful...' (Comp47 of S21) and 'Working for both one's own good and the common good ...' (Comp48 of S21), which backs the coherence of the dimension: 'The health/ healthcare professional's tolerance is very important. It doesn't matter is someone is of another religion, another creed, has another way of thinking [...] it's a matter of equity. We do not talk about justice, but about equity' (PD4:19).

LTL from different perspectives

Cognitive dimension

The Cognitive dimension was the most frequently mentioned one by the students (G=13). The subdimension 'Effective information management' obtained most remarks (G=7), followed by 'Critical and creative thinking' (G=3) 'Oral communication skills' (G=2) and 'Written communication skill' (G=1).

The students' testimonials indicate concern about learning techniques that allow them to efficiently manage information not only to learn in a purely academic context. They are concerned about using what they have learnt in their professional future; "[...] learning to use what I've learnt" (PD1:23).

The Cognitive dimension was that most frequently mentioned by the employers (G=9), and there were more remarks made about the subdimension 'Oral communication skills' (G=4), followed by 'Effective information management' (G=3) and then by 'Critical and creative thinking' (G=2). This second group stressed efficient oral communication and emphasized the professional-patient relationship as a source of learning: "[...] they know lots about medicine, plenty of theory, but then they don't know how to retrieve this information from a patient" (PD2:4). The professors and employees mentioned this dimension less (G=3 in both cases) (Figures 4 and 5). From a more didactic perspective, teachers focused on stressing the need for students to manage databases to allow them to continue learning as "databases are fundamental for learning to learn because, otherwise, you can't retrain" (PD4:6). The interventions made by the professionals group centered on preparing written and oral discourses from a self-critical perspective. They stated that "[...] communication is lacking" (PD3:14).

Metacognitive dimension

The Metacognitive dimension was that most frequently mentioned by the professors (G=6), as was the subdimension 'Problem solving' obtained the most remarks (G=4), followed by 'Knowing oneself' (G=2). The professors from the Health Sciences area clearly indicated being concerned about their students' capacity to analyze and solve problems efficiently in a non academic domain, where their considerations, planning, decision making and work will impact their patient's life. As a possible solution, they contemplated "[...] taking them closer to [...] the theoretical content that is seen in real situations. Solving real problems" (PD4:14).

Despite it not being the most frequently mentioned subdimension by the students, they did make several remarks about it (G=6). They mentioned the importance of 'Problem solving' (G=3), 'Self-assessment, self-control and self-regulation' (G=2) and 'Planning, organization and management of time' (G=1). The

students considered a vision related to problem solving that complemented the professors and referred to the need to “learn to react rather than [learn] a given technique to be applied, if you don’t know how to reason [...] the technique is useless” (PD1:26).

Nor was it the subdimension that the employees most frequently mentioned, although they did refer to it (G=7). There was talk of ‘Problem solving’ (G=5), ‘Knowing oneself’ (G=2), and ‘Planning, organization and management of time’ (G=1). The professionals followed the same line as the previous groups by arguing that for students to be competent, they had to solve real problems “[...] students arrive and face real [...] situations [...] they go blank, they don’t know [...] consider real situations with students themselves” (PD3:26).

The only group that did not mention this dimension was the employers group.

Affective dimension

Although the Affective dimension was not the most frequently mentioned one by all four groups, it appeared in three: students, employees and professors.

It was important for the students (G=12). They mentioned the importance of the subdimensions ‘Self-concept, self-esteem and self-efficacy’ (G=7), ‘Motivation and positive attitude toward learning and improvement’ (G=2) and ‘Emotional self-regulation and control of anxiety’ (G=2). On this occasion, the students centered the discourse on the need to know themselves, on self-assessments and being aware that “[...] knowing oneself helps you to [...] optimize time for studying [...] for acquiring new knowledge” (DP1:21). The employees also mentioned this (G=4) and all their remarks referred to the subdimension ‘Motivation and positive attitude toward learning and improvement’. They stressed ‘[...] curiosity to learn’ (DP3:17). The professors mentioned this less (G=2): the subdimension ‘Internal attributions’ was mentioned twice.

The employers did not remark about this dimension.

Social-Relational dimension

The Social-Relational dimension (D4) was that which the employees mentioned the most (G=12). Their remarks referred to the subdimension ‘Attitudes toward cooperation and solidarity; relationships’ (G=7), ‘Social values’ (G=5) and ‘Teamwork’ (G=2). In this Dimension, the employees built discourse around the interpersonal relations weaved with work teams, patients and the general public, which would be their

reality: “It’s a matter of contact [...] If you are not present, you won’t acquire it [the relationship] no matter how much theory you know” (PD3:24).

This was not the one mentioned the most by the other three groups, although all three referred to it. It was important for the employers (G=8), whose remarks referred to ‘Attitudes toward cooperation and solidarity; relationships’ (G=3), ‘Teamwork’ (G=3) and ‘Social values’ (G=2).

It was also important for the students (G=6), who made remarks about ‘Attitudes toward cooperation and solidarity ...’ (G=5) and ‘Teamwork’ (G=2). It was less important for the professors (G=1), who referred to the subdimension ‘Teamwork’ (G=1).

Generally speaking, the four groups coincided in the need to work on interpersonal relations by collaborative work that allows more fluent communication channels to become available. This would, in turn, allow diseases to be treated from a holistic and complementary viewpoint in different specialties.

Ethical dimension

Although no group mentioned the Ethical dimension first, they all referred to it.

It is striking that the employers mentioned it on more occasions (G=6) by referring to the importance of ‘Civic and moral attitudes and values’ (G=5) and to ‘Respect for deontological codes’ (G=1). The need to respect diversity was taken as a framework for good practices. The employees also mentioned it (G=4) when they referred to ‘Civic and moral attitudes and values’ (G=2) and to ‘Responsibility in learning’ (G=2). In the employees’ testimonials, it is interesting to stress a claim that appeared in their discourse, namely the need for professional respect “[...] There is always the matter of a struggle of egos, and the biggest ego always wins. The heart specialist is the best in the world, while the nurse is the worst [...] It is impossible to form a multidisciplinary team if we have no respect of others”. The students also mentioned it (G=2) in relation to ‘Civic and moral attitudes and values’ (G=1) and to ‘Responsibility in learning’ (G=1). The professors mentioned to a lesser extent (G=1) when referring to ‘Responsibility in learning’

Both the professors and students coincided in the need to be responsible and honest when informing the patient about the situation.

Discussion

The results obtained in the Health Sciences area validated the theoretical model designed by the research team as far as the most fundamental is concerned.

The intradimensional relations established by the participants, as seen in their remarks on the overall results, guaranteed the internal coherence of the dimensions. The interdimensional relations conferred the model general coherence given the connections among the five dimensions.

The Cognitive dimension (D1) received more remarks than the rest, and was the most important dimension for both students and employers. In this dimension, the subdimension 'Effective information management' (S1) was mentioned the most, which indicates its relevance. This is logical as LTL demands suitable performance insofar what this subdimension entails: handling relevant sources of information, seeking and selecting quality information, and suitably managing it to transform it into knowledge, store it comprehensively and efficiently retrieve it to use it, and use and transfer what has been learnt to other contexts. This also comes over clearly in the literature in the first strategic learning models (Weinstein, 1988; Weinstein and Mayer, 1985), and also in several self-regulated learning models (Boekaerts, 1991; Zimmerman and Martínez Pons, 1986; Panadero, 2017; Pintrich, 2004; Pintrich et al., 1993).

Remarks by the participants also appeared about 'Oral communication skills' (S2) and 'Written communication skills' (S3) and 'Critical and creative thinking' (S6). These last two subdimensions are not clearly formulated as relevant components in the literature at the beginning, but are included in subsequent formulations (Hautamäki et al., 2002) and the questioned groups.

No remark was made about either 'ICT management' (S4) or 'Knowledge and use of non verbal languages' (S4), despite the tested model including them. This was perhaps because the participants did not consider them important, or simply because they did not realize how relevant they were. Although efficient ICT use is a basic instrumental skill in the information and knowledge society, just as handling oral and written languages are, it represents such an omnipresent reality in our lives and learning activities that it sometimes escapes us. This is most certainly the reason why those surveyed did not realize how important ICT was for learning. Something similar occurred with non verbal languages: normally when we are asked about the language used to learn, we mention oral and written languages, and not using visual or iconic languages despite us using them to learn.

The Metacognitive dimension (D2) was mentioned by all the groups with many remarks, except for the employers. So it came over as an important dimension. Therefore, it is noteworthy that the employers did not mention its components in the remarks they made in the focus group. Perhaps it is not a matter of them ignoring these components because they considered them unimportant, but they did not realize this at the time. In this dimension, 'Problem solving' (S10) was considered the most relevant by the professors, students and employees. This is actually quite logical: LTL demands solving problems; here problems are understood as complex situations of uncertainty for which no easy automatic answer exists. Learning activities and the professional future present many uncertain complex situations in which it is necessary to make reasonable decisions based on available information, which often do not suffice, and to solve problems. This evidently occurs at university –when studying subjects, performing tasks, doing exams and undertaking professional practicals– and in subsequent professional work. S7,

'Knowing oneself...', S8, 'Planning, organization and management of time' and S9, 'Self-assessment, self-control and self-regulation', were all considered relevant. The participants related 'Knowing oneself...' to 'Planning, organization ...' and also to 'Self-assessment...', which is very coherent. It is necessary to know oneself and the context that one is working in to plan well and be able to properly implement set plans by evaluating one's own performance and using self-regulation to obtain good results by readjusting whenever necessary. With this sequence, this dimension appears in self-regulated learning models (Panadero, 2017; Pintrich, 2000; Thoutenhoofd and Pirrie, 2015; Zimmerman, 2002).

The Metacognitive dimension, like the Cognitive one, has also clearly appeared in the literature about this theme since the beginning, and also since talk on strategic learning, self-regulated learning and LTL started (Boekaerts, 1991; Panadero, 2017; Pintrich, 2000; Pintrich et al., 1993; Weinstein, 1988; Weinstein & Mayer, 1985; Zimmerman & Martínez Pons, 1986; Zimmerman, 2002).

The Affective dimension (D3) was remarked on by all four groups, and subdimension S11 ('Motivation and positive attitude toward learning and improvement') was the most relevant as a whole. For both the employees and professors, it was the main dimension, and was also an important one for the students, although they mentioned more S13, 'Self-concept, self-esteem and self-efficacy'. The students also attached some importance to S15, 'Emotional self-regulation and control of anxiety', and the professors to S12, 'Internal attributions'.

Although Motivation is fundamental for learning, it was noteworthy that the different groups centered only on 'Improving and maintaining motivation, curiosity, interest...', this being the first component of S11, and they did not attach the importance that other included components deserved, like 'Developing a strong will to learn...' (Comp26), 'Perseverance in learning...' (Comp27) or 'Tolerance to frustration...Resilience' (Comp28), which are all relevant. Indeed motivation may easily decline if a student is not resilient, does not show firm willingness and does not persevere while learning, despite the difficulties that (s)he will encounter (Cassidy, 2015; Galante et al, 2018; Hodge, Wright and Bennet, 2018).

All in all, no-one doubts the relevance of affective-motivational factors in LTL, found in D3, as they get the process moving and help to maintain efforts and interest in improving.

In fact, this is a dimension that also appeared early in the literature in studies about learning strategies (Weinstein, 1988; Weinstein and Mayer, 1985), but not with the importance that we attach to it today. This increase in its relevance has to do with it coming over more importantly in works about self-regulated learning, where it is a fundamental element (self-motivation, self-efficacy, etc.) (Panadero, 2017; Pintrich, 2000; Pintrich et al., 1993; Zimmerman and Martínez Pons, 1986; Thoutenhoofd and Pirrie, 2015; Zimmerman, 2002).

The participants made no remarks about subdimension S14, 'Physical and emotional well-being', which the model included. This subdimension refers to 'Maintaining a good physical and emotional tone, appropriate for learning ...' and to 'Keeping a healthy lifestyle (food, rest, sleep and exercise) helps for

learning'. They are also relevant elements for learning (Ewela Evinagbome and Nizam, 2016; Stoliker and Lafreniere, 2015), which the participants doubtlessly took for granted and, thus, did not mention them.

The Social-Relational dimension (D4) was also mentioned by all four groups. The employees attached more importance to it by emphasizing subdimension S17 ('Attitudes toward cooperation and solidarity; relationships'). The employers also stressed S17, as did the students. The four groups mentioned the importance of 'Teamwork' (S18). Another important subdimension for the employers and professionals was 'Social values' (S16).

This dimension took longer to appear in the literature about the theme. This was doubtlessly because in the strategic learning theory, which is linked to cognitive psychology and to information-processing theory, and ever since the first self-regulated learning models, an apprentice was taken to be an isolated subject who faced learning and tasks, and managed skills and strategies independently, with no cooperation with other students (Thoutenhoofd and Pirrie, 2015). However, the dimension that appeared with emphasis placed on the socio-cultural approach, and with more recent self-regulated learning models, which the students contemplated, especially as far as contextualized learning is concerned: paying attention to the social context, instructional keys, sources, time, etc. (Boekaerts, 1991, 2006; Panadero, 2017; Pintrich, 2000; Pintrich et al., 1993). Stringher (2014) places the social dimension in her model as a relevant dimension along the same lines that we propose: not only comprehending and controlling the contextual conditions of tasks, but also including social values, interpersonal relations, learning with others, etc. Hautamäki et al. (2002) also take it as a fundamental element of LTL.

As previously mentioned, no groups mentioned the subdimension 'Control of environmental conditions' (S19), which refers to creating a suitable environment for work. In this case, relevant LTL elements were also left to one side. In today's context, learning-centered models are being imposed, and students need to be able to control and handle the contextual elements that make learning hard, and also favor it, to achieve better quality learning.

The Ethical dimension (D5) was also mentioned by all four groups, but no group mentioned it first. The employers attached the most importance to it by stressing the subdimension 'Civic and moral attitudes and values' (S21). The employees also stressed S21, as did both the students and professors. Thus all four groups interpreted that 'LTL' had ethical connotations: it expects being honest, responsible, respectful of others and truthful, avoiding bad practices and working for both one's own good and the common good by contributing to a fairer and more equitable society. The employers also mentioned 'Respect for deontological codes' (S22) and students remarked on 'Responsibility in learning' (S20). The participants understood that being honest and responsible necessarily involved working for the common good, and they associated this with their professional responsibilities, which is important. What all this reinforces is the relevance of this dimension in the model, which is a novel contribution in the scientific literature and did not appear in the various models we analyzed. In any case, the last EU formulation (2018) also moves in this direction, and some authors in the academic community are known to understand that it cannot be ignored (Cortina, 2013; Buxarraís & Conceição, 2017). We ought not to forget

that ethical matters have always been fundamental for health professionals' training (Dent, Hardem and Hunt, 2017; Kass and Faden, 2018; Grace et al., 2017).

Limitations

This study is not without its limitations, which we now point out: one limitation has to do with the design type we employed, specifically in relation to the origin of the sample population and its size, which is small and limited to one knowledge field. It is true that the number of participants in the focus groups is sufficient, except for the employers group with only two participants for the reasons given. However, the final sample is limited in terms of the study's intention, that of validating a theoretical model, so resorting to other complementary perspectives is essential. Notwithstanding, the sample allowed the models to be validated from the Health Sciences perspective, which was collected from the four groups of key informants. Hence we are aware that it is necessary to resort to other informants from different knowledge areas so they can provide relevant information to complement that provided by the Health Science groups. This shall be done in other research phases.

Another of its limitations is related to the subjectivity of the interpretation made of the participants' contributions, which are always present in some form when processing qualitative data. Thus four research team members did joint work toward the interpretation.

Conclusions

Despite the aforementioned limitations, we believe that it can be stated that the research team's model, which was tested in the Health Sciences area, was endorsed by the participants as it is generally set out: the five dimensions clearly appeared in the four participating groups: the only exception went to the employers group, which did not remark about the dimensions Metacognitive and Affective-Motivational. Most of the subdimensions also appeared, but some were mentioned more than others.

Despite remarks about some subdimensions not being made, as we have indicated, the research team decided to leave them in the theoretical model because it considered them important. No mentions made to them could be simply because the participants were momentarily unaware of their relevance because questions had to be answered in the discussion groups, those answering had neither previous knowledge of questions nor a former period to reflect in. It is necessary to point out that no new categories appeared in the text analysis, which could have led to some subdimensions or dimensions not considered in the model, which is no doubt due to it being a sufficiently complete model that integrates the LTL competence.

Comparing the model with the perspective of other key informants from different knowledge areas will allow a more accurate validation, which will enable evaluation instruments and proposals for teaching LTL in university degrees to be designed.

Abbreviations

LTL: Learning to learn

EC: European Commission

EU: European Union

CRELL: Centre for Research on Education and Lifelong Learning

WL: Working Group

COMP: Componente

UVEG: Universidad de Valencia Estudi General

GIPU-EA: Grupo de Investigación en Pedagogía Universitaria y Estrategias de Enseñanza y Aprendizaje

D: Dimension

S: Subdimension

D1: Cognitive Dimension

D2: Metacognitive Dimension

D3: Affective-Motivational Dimension

D4: Social Dimension

D5: Ethical Dimension

G: Groundedness

D: Density

PD: Primary Document

Notes

¹ In this work, the results of the Groundedness scores are in brackets with a letter G, followed by the equal sign and the number of references the participants provided. For example, in this case the expression in brackets means that the Groundedness score of the Cognitive dimension was 28 or, in other words, the participants' referred to it 28 times. Subdimensions are mentioned indistinctly by including their name in single quotation marks ('Knowing oneself') or as an abbreviation (S7), as seen in Tables 2-5, or by both denominations. To indicate the components of subdimensions, the name is used in quotation marks,

including the full name or the first part of the full name if it is long, followed by suspension points... ('Using and transferring what has been learnt to other contexts...'), or the corresponding abbreviation (Comp2), as seen in Tables 2-5, or both denominations at the same time.

²This type of notation indicates the subdimension being referred to and its mentioned component. For example, (S1/Comp1) means the first subdimension ('Effective information management') and its first component ('Using relevant sources of information...'), which can be easily identified in Tables 2-5.

Declarations

Ethical approval and consent to participate

This research respects the ethical standards. In Spain no approval from any ethics committee is needed in this kind of research. We are not doing clinical trials or research on humans as usual in Health Sciences. When we ask for a grant to the Ministry, we sign a commitment to ethical standards and if the Ministry gives you a grant, it is understood that you respect these ethical standards. Papers about education don't need specific approval by any ethical committee.

Those who participated in the focus groups gave verbal approval to the researchers to use the data in possible future publications, always respecting the privacy and anonymity of the participants.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing Interest

The authors declare that they have no conflict of interest.

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Authors' contributions

The authors contributed to collect and process data and to write the paper.

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Tables

Table 1. Subdimensions of the Cognitive dimension and their description.

Cognitive dimension	
Subdimensions	Components
S1. Effective information management	Comp1. Using relevant sources of information. Searching, selecting and properly managing information, transforming it into knowledge, storing it comprehensively and retrieving it efficiently to use it.
	Comp2. Using and transferring what has been learnt to other contexts (daily life, solving academic and professional problems, and similar skills).
S2. Oral communication skills	Comp3. Effective oral communication, transmitting knowledge and ideas, clearly, rigorously and convincingly.
	Comp4. Expressing by oral communication in a structured intelligible way in both short oral presentations and long speeches with subsequent debate.
	Comp5. Offering arguments and counterarguments appropriately.
	Comp6. Adapting to the context and the audience.
S3. Written communication skills	Comp7. Effective written communication, transmitting knowledge and ideas clearly, rigorously and convincingly.
	Comp8. Expressing by written communication in logical order with good construction, and preparing well-structured documents that adapt to different purposes.
	Comp9. Writing rigorous texts with scientific and technical quality related to the study area, reports, end-of-degree projects and similar tasks.
S4. Knowledge and use of non verbal languages	Comp10. Knowing and handling languages other than verbal: visual, iconic, artistic, etc., as a means to learn.
S5. ICT management	Comp11. Effective ICT application in learning and professional activity (word processors, spreadsheets, presentation software, statistical packages of specific areas wherever necessary, search engines and databases, and so on).
S6. Critical and creative thinking	Comp12. Making creative personal proposals that go beyond what is given.
	Comp13. Conducting differentiated analysis, inferences and critical reasoning on life tasks and situations.
	Comp14. Challenging the assumptions underlying the usual ways of thinking and acting.
	Comp15. Producing new thinking -thinking differently- about the working reality.

Table 2. Subdimensions of the Metacognitive dimension and their description.

Metacognitive dimension

Subdimensions	Components
S7. Knowing oneself, the task and strategies	Comp16. Identifying one's own skills and limitations to improve them as much as possible.
	Comp17. Thinking about and analysing the task, its objectives and strategies that are necessary for an approach and solution.
	Comp18. Questioning learning objectives and formulating one's own objectives.
	Comp19. Making decisions about what and how to learn based on one's own objectives and needs and/or professional performance.
- Planning, organization and management of time	Comp20. Planning well tasks to achieve the expected short-, mid- and long-term objectives, depending on the context and available time.
	Comp21. Prioritising, organizing and carrying out the activities required.
S9. Self-assessment, self-control and self-regulation	Comp22. Analyzing, evaluating and monitoring one's own performance, establishing the mechanisms required to improve execution and incorporating necessary adjustments in both planning and implementation, by using more efficient strategies and skills.
	Comp23. Seeking guidance, advice and support if necessary.
S10. Problem solving	Comp24. Analyzing and solving problems in an effective and contextualized manner, identifying and defining the significant elements constituting them, and developing high-level complex reasoning processes, and not simply associative and routine actions.

Table 3. Subdimensions of the Affective-Motivational dimension and their description.

Affective-Motivational dimension

Subdimensions	Components
S11. Motivation and positive attitude toward learning and improvement	<p>Comp25. Improving and maintaining motivation, curiosity, interest and enjoyment to understand contents and in-depth learning.</p> <p>Comp26. Developing a strong will to learn, guiding actions in the right direction to achieve successful results.</p> <p>Comp27. Perseverance in learning, concentration for long periods of time, overcoming difficulties.</p> <p>Comp28. Tolerance to frustration when success in learning is not achieved. Resilience.</p>
S12. Internal attributions	Comp29. Attributing learning outcomes and performance to one's own effort that oneself controls and manages.
S13. Self-concept, self-esteem and self-efficacy	<p>Comp30. Having an adjusted image of oneself, accepting and appreciating oneself, which is compatible with being aware of one's own limitations and with efforts to improve.</p> <p>Comp31. Increasing self-efficacy, feeling able to achieve the demanded objectives and being successful doing tasks.</p>
S14. Physical and emotional well-being	<p>Comp32. Maintaining a good physical and emotional tone, appropriate for learning and working.</p> <p>Comp33. Keeping a healthy lifestyle (food, rest, sleep and exercise) to help learning.</p>
S15. Emotional self-regulation and control of anxiety	<p>Comp34. Observing, analyzing and modifying emotional reactions in a socially acceptable way according to the learning objectives.</p> <p>Comp35. Controlling anxiety, learning to relax in stressful situations (exams, public speeches, and so on).</p>

Table 4. Subdimensions of the Social-Relational dimension and their description.

Social/Relational dimension

Subdimensions	Components
S16. Social values	Comp36. Valuing interpersonal relationships and working with others to learn with and from them.
	Comp37. Working, studying and striving to contribute to society as a whole, not only for one's own personal development.
S17. Attitudes toward cooperation and solidarity; relationships	Comp38. Effective peer cooperation for problem solving, studying, learning with and from them and working.
	Comp39. Establishing and maintaining good relationships with peers and teachers.
	Comp40. Negotiating, sharing, arguing respectfully for the opinions of others, etc., developing adequate social skills: listening, empathy, assertiveness and solidarity in relationships with others.
S18. Teamwork	Comp41. Carrying out tasks, sharing objectives and interests, overcoming any difficulties that may arise in doing so.
	Comp42. Actively participating in working groups by contributing ideas and efforts, receiving and giving help, leading whenever necessary and similar reactions.
S19. Control of environmental conditions	Comp43. Creating a suitable environment for working and performance that allows concentration and has the necessary means and resources.
	Comp44. Modulating the elements of the context for better learning.

Table 5. Subdimensions of the Ethical dimension and their description.

Ethical dimension	
Subdimensions	Components
S20. Responsibility in learning	Comp45. Keeping a responsible attitude toward learning by taking advantage of available time and resources.
	Comp46. Striving for efficient and committed work, for doing things as best as possible, avoiding incomplete and incorrect work.
S21. Civic and moral attitudes and values	Comp47. Being honest, responsible, respectful of others and truthful. Avoiding practices such as plagiarism.
	Comp48. Working for both one's own good and the common good, contributing to progress toward a more just and equitable society.
S22. Respect for deontological codes	Comp49. Incorporating ethical and deontological codes into professional practice, respecting human rights, working rigorously, respecting professional secrecy, not abusing one's position when in power, etc.

Table 6. Sample

	UVEG (Health Sciences)			Total
	N	Men	Women	
Employers*	2	0	2	2
Employees	6	2	4	6
Teachers	6	3	3	6
Students	6	3	3	6
Total	20	8	12	20

(*) Although four employers were cited, only two could attend the focus group meeting, and both were female. Two hospital directors could not come due to a serious case in emergency services.

Table 7. Rooting data. Number of Comments

Dimensions	Comments	Subdimensions	Comments	Components	Comments
D1 (Cognitive)	28	S1	12	Comp2	7
				Comp1	5
		S2	7	Comp3	5
				Comp6	2
				S6	7
		S3	2	Comp14	2
				Comp12	1
				Comp7	1
				Comp9	1
		D2 (Metacognitive)	19	S10	11
S7	4			Comp18	3
S8	2			Comp20	2
				Comp21	1
S9	2			Comp22	2
D3 (Affective-Motivational)	18	S11	8	Comp25	8
		S13	5	Comp30	4
				Comp31	1
		S15	2	Comp35	2
		S12	1	Comp29	1
D4 (Social-Relational)	18	S17	15	Comp40	12
				Comp38	3
		S18	7	Comp42	6
				Comp41	1
		S16	5	Comp36	3
Comp37	2				
D5 (Ethical)	13	S21	9	Comp47	6
				Comp48	3
		S20	3	Comp46	2
				Comp45	1
		S22	1	Comp49	1

Table 8. External relations (Density)

Dimensions	Subdimensions	External relations
D1 (Cognitive)	S1	S7, S9
	S6	S10
	S2	S12
D2 (Metacognitive)	S7	S1
	S8	S16
	S9	S1, S16
	S10	S6
D3 (Affective-Motivational)	S12	S2, S18
	S11	S18
D4 (Social-Relational)	S17	S20, S21, S22
	S18	S11, S12
D5 (Ethical)	S20	S17
	S21	S17
	S22	S17

Table 9. Internal relations (Density)

Dimensions	Subdimensions	Internal relations
D1 (Cognitive)	S2	Comp3 with Comp6
	S3	Comp7 with Comp9
	S6	Comp12 with Comp13 and with Comp14
D2 (Metacognitive)	S7	Comp18 with Comp19
	S8	Comp20 with Comp21
	S7 and S9	Comp18 with Comp22
D3 (Affective-Motivational)	S11 and S13	Comp25 with Comp30
	S11 and S12	Comp25 with Comp29
D4 (Social-Relational)	S17	Comp38 with Comp40
	S18	Comp41 with Comp42
	S18	Comp38 with Comp42
D5 (Ethical)	S21 and S22	Comp47 with Comp49
	S21 and S22	Comp48 with Comp49

Figures

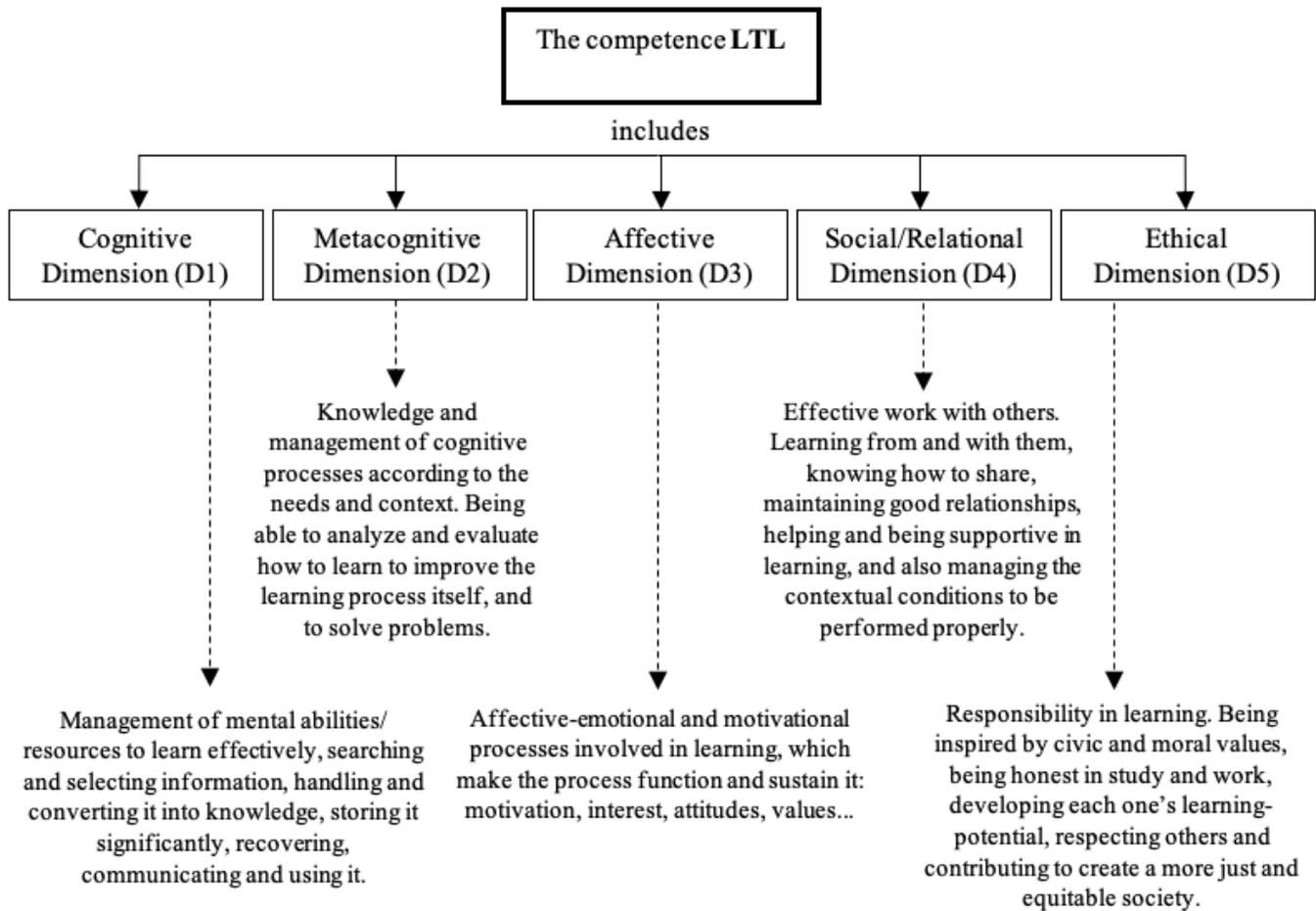


Figure 1

Dimensions of the LTL competence

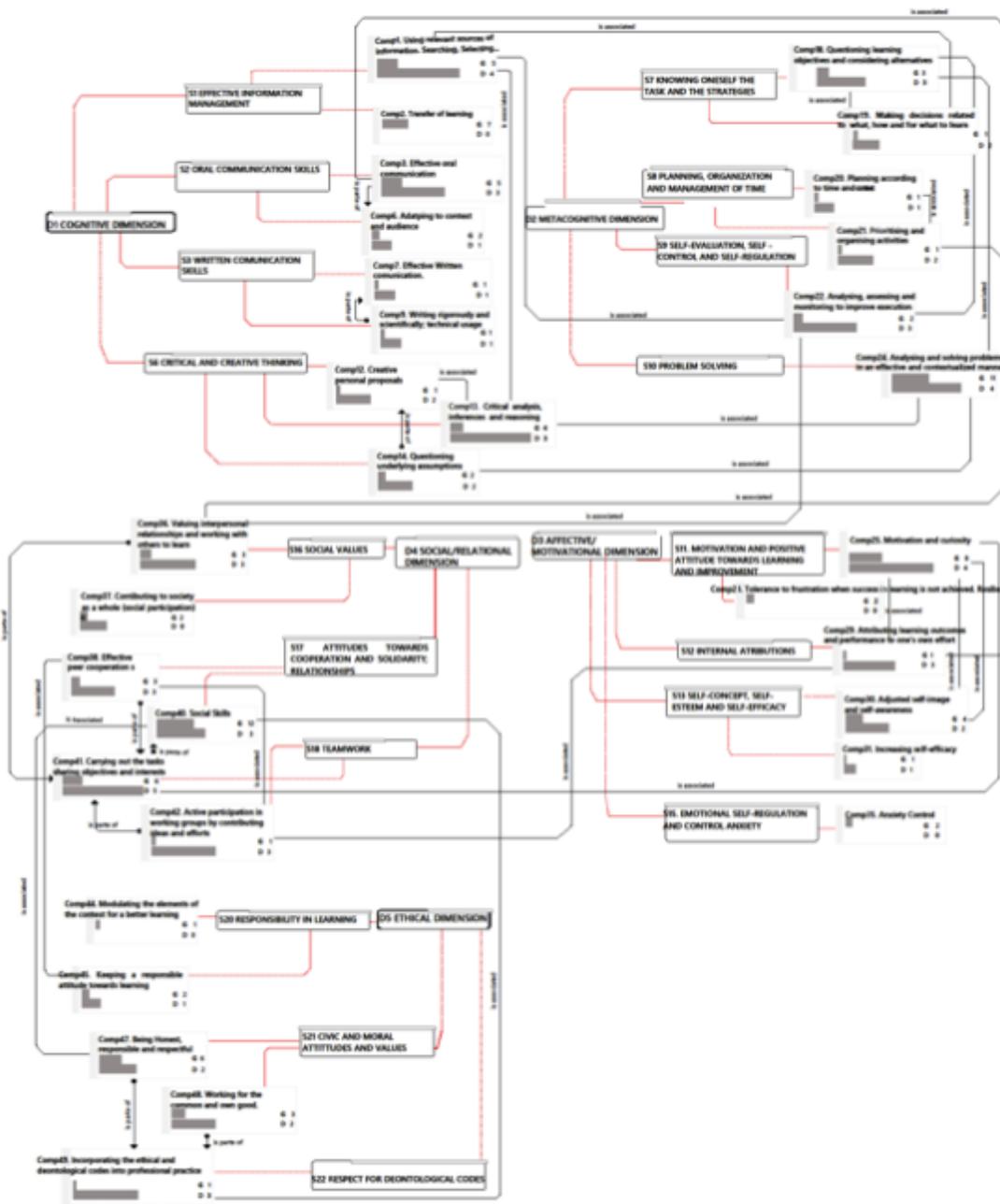


Figure 2

Overall Health Sciences data

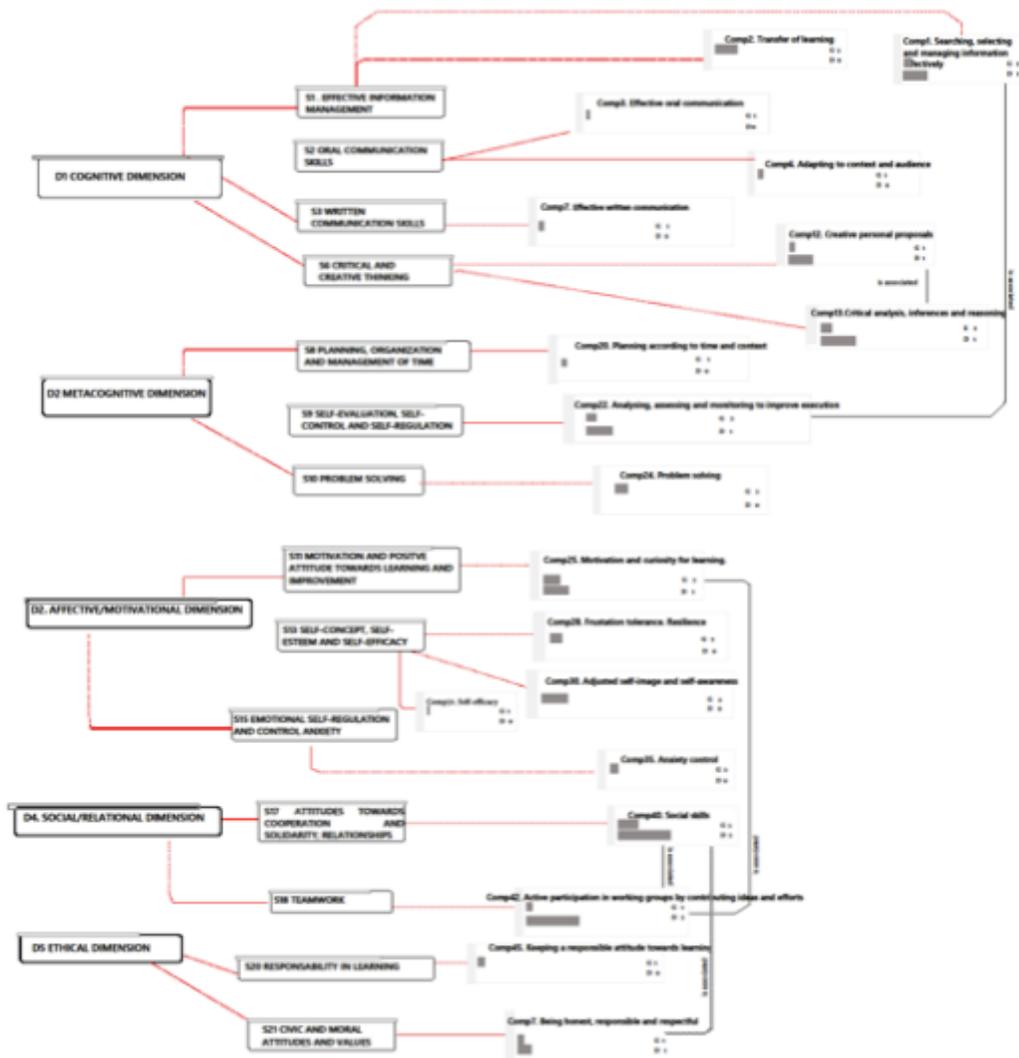


Figure 3

Data on the Health Sciences students

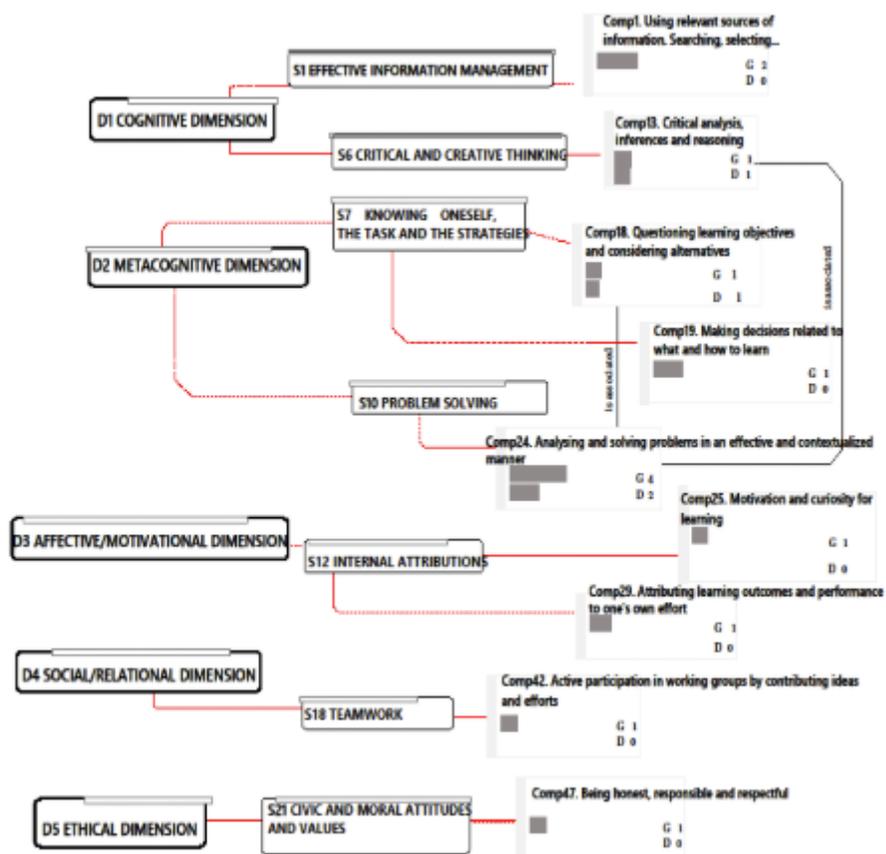


Figure 4

Data on the Health Sciences professors

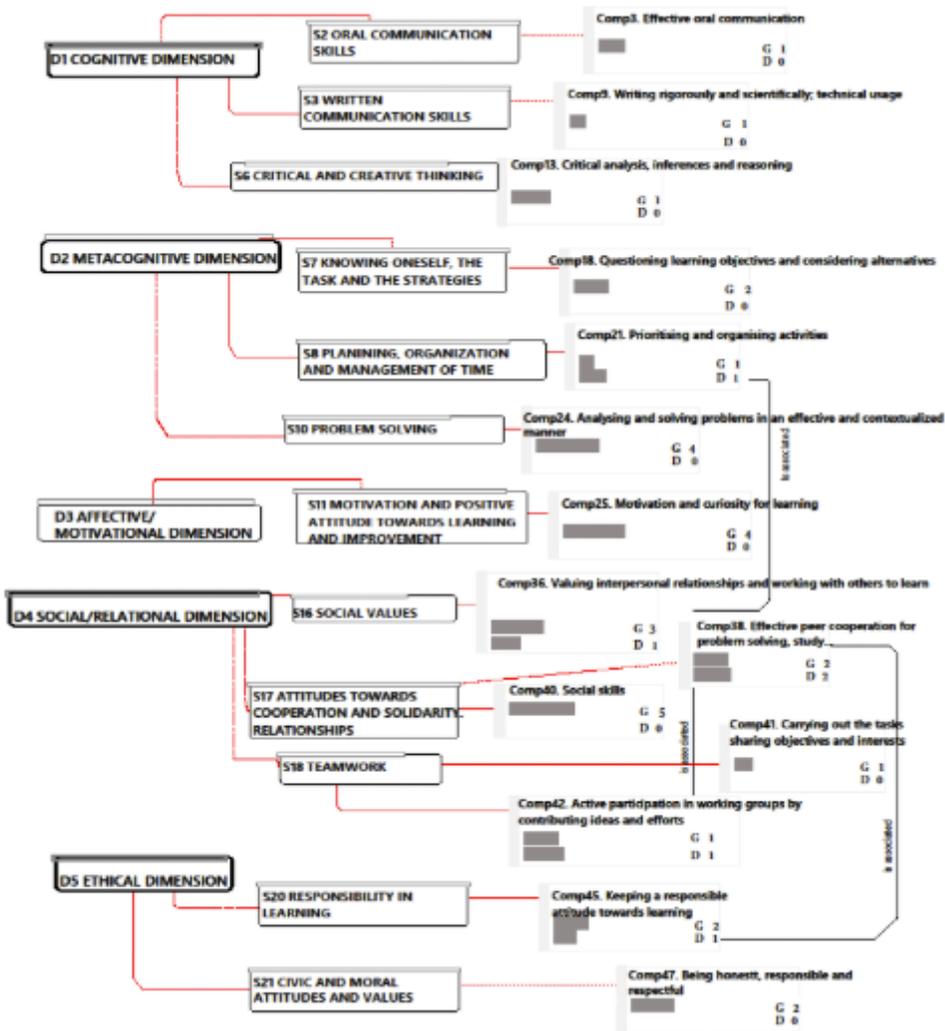


Figure 5

Data on the Health Sciences employees

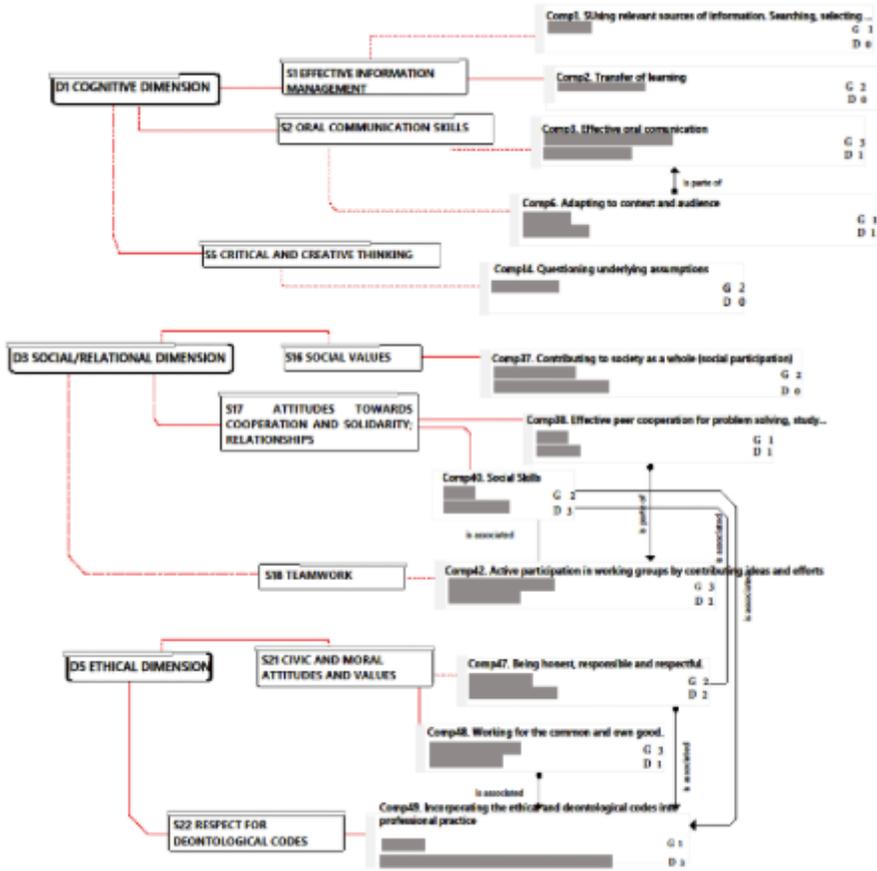


Figure 6

Data on the female Health Sciences employers