Papers on Social Representations
Volume 33, Issue 2, pages 5.1-5.28 (2024)
Peer Reviewed Online Journal
ISSN 1021-5573

[http://psr.iscte-iul.pt/index.php/PSR/index]

Socio-professional Representations of Paramedical Students Regarding Their Future Profession

ABDELMONIM EL FADELY[1], MOHAMED AIT BABRAM[2], SAMIHA LIDRISSI-HASSANI[1], RACHEL MORLOT[3], SABAH SELMAOUI[1], BOUJEMAA AGORRAM[1]

[1] Laboratory in Didactic, Education and Training (LIRDEF), Normal Graduate School, Cadi Ayyad University, Marrakech, Morocco.
[2] Department of Mathematics, Faculty of Sciences and Techniques, Laboratory of Mathematical Population Dynamics (LMDP), Cadi Ayyad University, Marrakech, Morocco.
[3] Laboratory Psy-DREPI (UR-7458), Psychology: Relational Dynamics and Identity Processes, Université de Bourgogne, Dijon, France.

The phenomenon of specialization among nursing categories can lead to difficulty in constructing a common professional identity and generate issues of professional adaptation. This study aims to explore the socio-professional representations of paramedical students and compare these representations among two categories of students. The research targets 695 undergraduate students in two programs: 'nursing care' (*n*= 562) and 'healthcare-techniques' (*n*=133), from three training institutes located in the Marrakech-Safi region of Morocco. Regarding the theoretical framework, this study uses the structural approach of social representations. Data are collected through free and hierarchical associations, analyzed through prototypical analyses, similarity analyses, and a Chi-squared test. The results emphasize heterogeneous representations, with shared elements and others specific to each group. Nursing students characterize the nursing profession as laborious and stressful. Nurses are described as autonomous individuals demonstrating professional values and interpersonal qualities. For students in the healthcare technicians' group, the

Correspondence should be addressed to: abdelmonim.elfadely@ced.uca.ma

representation focuses primarily on clinical practice concepts. The hospital appears, for this group, as a privileged environment for care practice. It is therefore incumbent upon various stakeholders in the nursing education field to consider the representative structures held by students in the course of their training and to implement strategies to minimize potential representational divergences.

Keywords: Socio-professional representation; paramedical professions; education; free and hierarchical associations; training; cognitive polyphasia.

INTRODUCTION

Nursing Education in Morocco

In order to meet the evolving healthcare needs of the population, the healthcare system should ensure the training of healthcare professionals capable of adapting to scientific and technical advancements and possessing the necessary soft skills for delivering quality care. In Morocco, the nursing education system underwent a historical turning point with the establishment of many Institutes of Nursing and Health Technologies (ISPITS). These institutes are integrated into the Bachelor-Master-Doctorate (BMD) system, starting from the academic year 2013-2014 (Moroccan Ministry of Health, 2015).ISPITSs are organized in accordance with the framework law n°01.00 concerning the organization of higher education (Moroccan Ministry of Health, 2013). This reform aims to ensure the professional training of nurses and healthcare technicians (HT) competent in their specialized fields, with a high-quality academic level enabling smooth integration into the workforce. The undergraduate program comprises five majors: nursing care, healthcare technologies, rehabilitation, midwifery, and medical-social assistance. Apart from the last two majors, all the others include more than one specialization, totaling to about twenty-four in total in all the 12 regions, including Marrakech-Safi region that this research paper specifically targets.

These varieties of specializations at ISPITSs prompt us to explore how students in different medical fields perceive the reality of their future profession. According to Becouze et al. (1996), the abundance of specializations within nursing categories may potentially lead to adaptation issues and difficulties in constructing a professional identity. Indeed, nursing students and healthcare technicians enter nursing education with different social

representations of their future profession. From the second year of their education onward, these representations undergo gradual transformations (Boittin, 2002), encompassing changes in their representations, attitudes, and behaviors (Becouze et al., 1996), particularly through interactions with practicing nurses and experiences gained in clinical settings (Van Iersel et al., 2016). Therefore, the study of representations is of paramount importance for educational systems (Piaser & Ratinaud, 2010).

As mentioned before, this study mainly focuses on undergraduate paramedical students who exclusively study in the Marrakech-Safi region. These students are divided into two main categories: nurses and healthcare technicians. On the one hand, a nurse is a healthcare professional providing direct patient care, including monitoring clinical signs, administering medications, wound care, and assisting physicians. Nurses are also responsible for coordinating care and providing therapeutic patient education. On the other hand, a healthcare technician is a professional who collaborates with nurses and physicians to perform specific technical tasks. Healthcare technicians play a crucial role in diagnosing and treating patients by providing accurate results and assisting in medical decision-making. Despite these differences, both nurses and healthcare technicians are part of the healthcare domain and fall under the umbrella of paramedical professions. They both work closely together to ensure the best possible patient care. They share some similarities in their professional domain, such as collecting medical data, communicating with patients, implementing care protocols, collaborating with other members of the medical team, and providing basic care to patients.

In Marrakech-Safi context, the two categories of students targeted by this study go through separate trainings, but once recruited, they work together within multidisciplinary teams. These students all get admitted to ISPITS with similar admission requirements, go through the same progression, have a three-year graduation program, and are held to the same standards and objectives. Nonetheless, each specialization has its own separate training program and is managed independently. Indeed, the two categories do not interact within the same framework of learning activities. Therefore, it will be interesting to study the possible differences in socio-professional representations among Marrekch-Safi-based students. This will allow us to distinguish the group of students who share the same systems of values, notions, and professional practices from those that do not (Piaser, 1999, p. 19).

Social Representations

Social representations have been studied in human and social sciences for over sixty years. They can be understood and viewed as modes of knowledge collectively produced and shared by individuals within a social or cultural group (Moscovici, 2001). Social representations refer to "a set of information, beliefs, values, opinions, and attitudes related to a given object" (Abric, 2005, p. 59). They are dynamic, evolving structures that are continuously reconstructed (Bonardi & Roussiau, 1999, p. 7). Additionally, a social representation is "a form of knowledge, socially elaborated and shared, with a practical purpose and contributing to the constitution of a common reality within a social group. Also referred to as "common sense knowledge" or "naive" or "natural" knowledge, this form of knowledge is distinguished, among other things, from scientific knowledge" (Jodelet, 2003, p. 53).

Professional Representations

Professional representations constitute a specific form of social representations. In other words, professional representations concern specific objects within the professional sphere and are specifically shared by a portion or the entirety of the members of a profession (Mias & Piaser, 2016). Similar to social representations, professional representations serve multiple functions within the confines of the professional sphere. In addition to their function as a form of knowledge, they guide actions, justify behaviors, ensure the professional identity of the group, and enable the preservation of its specificity (Abric, 1994, p. 16). Within the scope of this study, it is precisely this identity function that interests us most. Since the possession of similar representations by all students would enhance their sense of professional belonging, it could facilitate integration within a multidisciplinary team and the provision of quality care.

It is agreed that these professional representations are formed in part during the professionals' training. In the initial professional training, the students have the status of an intern, which differs from that of a professional. The intern can only acquire the status of a professional nurse after obtaining the diploma and actual integration into the professional environment. However, for the student entering the training system, the profession is already somewhat familiar (Fraysse, 2000, p. 672). Faced with such a situation, where professionalization is under construction, term used is that of socio-professional representations.

Socio-professional Representations

Before transforming into professional representations, social representations first go through the stage of pre-professional representations (Piaser & Bataille, 2011), also referred to as ‘socio-professional representations’. According to Fraysse (2000), these representations "precede professional action and express the reconstructions that the intern carries out based on elements known at a certain point in training" (p. 672). This transition occurs during the process of a professionalizing education (Piaser & Ratinaud, 2010, p. 11). The latter constitutes one of the vectors of professional socialization, where the transmission of a set of information, codes, values, and professional beliefs takes place (Dubar, 2010). Thus, throughout the initial training, teachers and supervisors of nursing students must actively implement an approach to accompany the transformation process of students' representations (Teiger, 1993). This is to ensure that all experiences experienced during the training are collectively recognized and no longer perceived as individual reactions to the constraints of the situation (Bataille, 2000, p. 178).

The formation of socio-professional representations does not imply an irreversible state towards socially constructed forms of knowledge. On the contrary, within the same group, the same object can generate distinct representations depending on the context in which it is placed: social or professional (Ratinaud, 2003). According to Moscovici (2004), the dynamic coexistence of distinct modes of knowledge, corresponding to defined relationships between individuals and their environment, determines a state of cognitive polyphasia. This highlights the dynamic and non-static nature of social representations and their heterogeneity. Indeed, individuals can simultaneously activate different modes of thought depending on their group membership and the context in which they find themselves. In the context of professional training, two levels of knowledge intersect: social representations, and professional knowledge validated and legitimized by training institutions. In this process, students alternately mobilize these types of knowledge and modes of thought, combining patterns of natural thinking with a more elaborate mode of reasoning (Lautier, 1994). The theory of cognitive polyphasia thus leads us to prepare to accommodate the variation and even conflict of intra- and intergroup representations. Most authors recognize that representations are formed, maintained, and changed within and through language and communication. It is therefore through heterogeneous interactions between groups and their specific contexts that a variety of thinking styles occur (Flament & Rouquette, 2003, p. 13). In connection with their identity function, socio-professional representations fall under

regulation through a homogenization function (which leads to group cohesion) and specification (compared to another group), thereby reinforcing a sense of professional belonging (Abric, 1994, p. 16). Essential to this identity's development is establishing universally shared representations among paramedic students.

Methods for collecting and processing representations

While the study of representations allows an approach to the symbolic domain and deals with the meanings individuals attribute to their practice (Vergès, 2001), the question is how to access the content of a representation. Building upon Moscovici's original model, commonly known as the socio-genetic approach, four main theoretical orientations have been developed, namely: the ethnographic orientation (Jodelet, 1989), the socio-dynamic approach (Doise, 1990), the dialogical approach (Markova, 2003), and the structural approach (Abric, 1976). The structural approach focuses on the content of representations, their organization, and revolves around the hypothesis that "every representation is organized around the central core" (Abric, 2005, p. 59), which gives it its rationale and coherence. Vergès (1992) used Central Core theory to develop a technique named Free and Hierarchical Associations through analyzing verbal associations and classifying them into two systems: one central and the other peripheral. These two elements have specific yet complementary characteristics. The central core is the element that determines the meaning and organization of the representation, ensuring its stability and permanence (Abric, 2005, p. 60).On the other hand, the peripheral system complements the central core: it regulates, defends, and concretizes central meanings according to the diversity of contexts and individualities. Indeed, the peripheral system serves as the interface between the central core and reality (Abric, 1994, p. 25). It is worth noting that free and hierarchical associations are commonly used in the study of social representations (Asloum & Bedoussac, 2020; Bastias et al., 2020; Fasanelli et al., 2020; Novais et al., 2020; Pozzi et al., 2022).

Studies on the Representations of Paramedical Students Regarding Their Professional Environment

When reviewing articles that address socio-professional representations among paramedical students, we observed that these have been approached from various perspectives. Some studies have explored students' representations based on a gender approach (Maillet-Contoz et al., 2019; Prosen, 2022), aiming to study the evolution of representations during the course of

initial training (Brodie et al., 2004; Dos Santos Lima et al., 2018), or even to predict factors related to dropout (Alshutwi et al., 2021). Representations have also received attention from researchers in terms of comparative aspects, either among paramedical students at the beginning and end of their training (Bastias et al., 2020; Mendes et al., 2016), between paramedical students and their clinical supervisors (Novais et al., 2020), or between the former and practicing nurses (Lovan, 2009). Finally, studies have also focused on comparing the representations of paramedical students with those of students in other disciplines (Gandon & Hardy-Massard, 2019; Jubas & Knutson, 2012).

This research aims first to understand how students from two training programs (nursing and healthcare technicians) perceive their future profession. Second, it seeks to compare the socio-professional representations of the two categories of students, with the perspective of adapting nursing education to promote collaboration and interactivity between them.

MATERIALS AND METHODS

Study Design and Participants

This research adopted a multi-central cross-sectional design, employing a consensus sampling approach. The study framework was guided by the structural approach of social representations. The adoption of the structural approach of social representations as the theoretical framework provided a methodological lens through which to investigate the collective construction and interpretation of paramedical students regarding their future profession.

Following a consensus sampling method, 695 out of 725 distributed questionnaires were collected, resulting in a robust response rate of 96%.This study involved a total of 695 students, encompassing second and third-year attendees from three training institutes situated in Marrakech, Essaouira, and Safi. The institutes had enrollments of 468, 119, and 108 students, respectively.

For simplification, students were categorized into two groups: ‘Nurses’ (*n*=562) and ‘Healthcare Technicians’ (*n*=133). The ‘Nurses’ group encompassed students specializing in versatile nursing, family and community health, anesthesia and resuscitation, emergency and intensive care, mental health, neonatology, and pediatrics. Meanwhile, the ‘Healthcare Technicians’ group included students specializing in radiology, laboratory, orthoprosthesis, and physiotherapy.

The observed disparity in the total number of participants across the two groups in our study is substantiated by the quota policy of the Moroccan Ministry of Health. Specifically, the Ministry of Health annually allocates a greater number of positions for the training of nursing students compared to healthcare technicians. This strategic allocation is attributable to the escalating demand within the nursing domain, thereby resulting in a higher enrollment within the nursing group.

Furthermore, a notable predominance of female participants was evident in this study, comprising 77.12% of the total sample. This trend persisted within both subgroups of the study population, with female participants accounting for 77.76% among nurses and 74.44% among healthcare technicians, respectively. Of importance, first-year students were excluded from the study because they have not yet developed a clear understanding of certain elements that this study targets, specifically the clinical environment.

It should be noted that we have received written permissions from the three ISPITS administrations to conduct our research, informed the participants about the purpose of the research, and got their written consent to collect data. Confidentiality and anonymity were ensured to participants. Also, the study is approved by the local ethical committee of Mohammed VI University Hospital (60/2023).

Data Collection

Data collection was carried out between May and June of the year 2023. The participants were gathered at the three ISPITS and were given written questionnaires to complete. The questionnaires contained questions regarding socio-demographic variables, information about training programs, as well as instructions corresponding to the free and hierarchical associations (Abric, 2005). First, we used these stimuli words ‘nursing profession’ for the nursing group and ‘healthcare technician profession’ for the healthcare technicians group, and asked them to initially produce six words, or ideas that spontaneously come to their minds. Second, we asked the participants to rank those same words in order of importance on a scale from 1 to 6, where 6 is the least important.

Students in the nursing group and the healthcare technicians group might not necessarily identify with the categories ‘healthcare technician profession’ and ‘nursing profession’, respectively, and this could stimulate social representations rather than socio-professional representations. Therefore, it was pertinent to use a specific inducer for each group of students.

Data Analysis

All the words or expressions collected in the questionnaires are lemmatized; this means using the lexeme of the word (masculine, singular, infinitive) for all the terms generated (Lebart & Salem, 1994). Prior to the analyses, pre-processing of the associations was carried out to group similar categories (e.g., helping others, helping people, helping patients, offering help, social aid, and support were grouped under the category: help). Then, using the software IRaMuTeQ version 0.7 alpha 2, the corpus underwent a prototypical analysis. This analysis aims to identify potentially central elements by crossing two quantitative indicators: the frequency of word occurrence and the rank of importance assigned to it (Salès-Wuillemin & Morlot, 2008). Following the technique used by Vergès (1992), we chose to cross the average frequency of word occurrence with their average rank of importance. For each analysis, the average rank and the average frequency were established by default by the software used. To identify the frequency limit of interconnected words that decide which terms are included in the prototypical analysis, we relied on the binomial test. This test, based on the binomial distribution, allowed us to calculate the minimum number of citations for a word to be present in the corpus not due to chance, indicating its shared nature (Lacassagne et al., 2001). We chose to consider only words produced with a probability ($p < .01$). Thus, the selected thresholds are: 9 for the nursing group and 6 for the healthcare technicians group. (The threshold only indicates the number of participants that mention any term). Subsequently, a similarity analysis was conducted (the number of times words appear together): it is a co-occurrence analysis that allows schematizing the elements of the representation in the form of a maximum tree, a "connected and cycle-free graph" (Degenne & Verges, 1973, p. 473), where elements are interconnected, showing the relationships between the different items mentioned by the participants. The minimum similarity threshold was set through trial and error to eliminate edges with very low values, aiming for a clearer visibility of the structure of the representational field. To optimize the display of graphs and visualize terms acting as intermediaries between other words, the Fruchterman and Reingold algorithm (Fruchterman & Reingold, 1991) was utilized.

We complemented our analysis with a Chi-Square independence test. This statistical test indicates the significant difference and helps determine if the attributed words are typical of a particular group. When the probability ($p < .05$), we consider the difference to be significant.

RESULTS

We observed a female predominance with a sex ratio of 3.37 (M/F). The average age of the students (across all specializations) is 20.58 (±1.18) years, with extremes ranging from 18 to 35 years. Based on the year of enrolment in the program, 370 participants are enrolled in the 2nd year and 325 in the 3rd year. Table 1 summarizes their socio-demographic characteristics and specializations.

Table 1

Participants' Socio-demographic Characteristics

		Nurses (*n*=562)		Healthcare Technicians (*n* = 133)	
		N	%	*N*	%
Gender	Female	437	77.76	99	74.44
	Male	125	22.24	34	25.56
Age	18-23	560	99.64	130	97.75
	24-29	2	0.36	2	1.50
	30-35	0	0	1	0.75
Year of enrolment	Year 2 (semester 4)	291	51.78	79	59.40
	Year 3 (semester 6)	271	48.22	54	40.60
Training specialities	Versatile nurse	308	54.80	-	-
	Family and community health nurse	89	15.84	-	-
	Mental health nurse	36	6.41	-	-
	Anaesthesia and resuscitation nurse	46	8.19	-	-
	Emergency and intensive care nurse	45	8	-	-
	Neonatology and paediatrics nurse	38	6.76	-	-
	Laboratory technician	-	-	46	34.59
	Radiology technician	-	-	42	31.58
	Ortho-prosthetist	-	-	31	23.31
	Physiotherapist	-	-	14	10.52

Note: Table 1presents the socio-demographic characteristics of participants divided into two groups: Nurses and Healthcare Technicians. The data include gender, age, year of enrolment, and training specialities. The percentage values represent the proportion of each subgroup within the total number of participants for each category. For the Nurses group, the total sample size is 562, and for the Healthcare Technicians group, it is 133. In the "Training Specialties" section, "-" indicates that the category is not applicable to the respective group.

Descriptive Analysis

The corpus of the analysis is composed of 4049 occurrences (3252 from the nursing group and 797 from the healthcare technicians group), for 928 terms (769 nursing / 359 HT), including 541 hapax legomenon (470 nursing / 233 HT). On average, the evocations consisted of 5.79 occurrences for the nursing group and 5.99 occurrences for the HT group.

Prototypical Analysis

For participants in the nursing group, the semantic content of the central core (frequencies ≥ 28.99 and ranks ≤ 3.32) encompasses 12 concepts (see Figure 1a). Regarding the healthcare technicians group, the central core (frequencies ≥ 12.17 and ranks ≤ 3.24) contains 5 concepts (see Figure 1b). To better highlight the representation of students in both groups, these concepts have been reformulated in the following excerpts. However, the methodology used is limited to quantifying the importance assigned to different words, and the interpretation attributed to them remains debatable (Asloum & Bedoussac, 2020).

The nursing students describe their future profession as ‘noble’ that seeks to provide ‘humanistic’ ‘care’ and is based on values of ‘respect’, offering all necessary ‘help’ to alleviate suffering. They anticipated facing professional situations that could generate ‘stress’. To practise this profession with significant ‘responsibilities’, students also deem it necessary to possess a set of professional ‘competence’ such as ‘professionalism’, ‘autonomy’, and ‘patience’. On the other hand, students in the healthcare technicians group represented the healthcare technician profession as one with significant ‘responsibilities’, involving providing patient-centered ‘care’ and emphasizing values of ‘respect’ for the individual within the ‘hospital’ environment.

The prototypical analysis reveals that the induced words ‘responsibility’, ‘respect’, ‘care’, and ‘patient’ are consistently present in the central core of both subgroups of the population. Three notions, namely ‘professionalism’, ‘competence’, and ‘noble profession’, which are part of the central core for the nursing group, appeared in the contrast zone of the healthcare technicians' group. The term ‘help’, situated in the central core of the nursing group, is placed in the first periphery for the healthcare technicians' group. Conversely, the term related to the professional practice context, ‘hospital’ is placed in the central core by the healthcare technicians' group. The concept related to the value of ‘humanity’, positioned in the central core for the nursing group, is found in the second periphery for the healthcare technicians' group. The terms ‘autonomy’, ‘stress’, and ‘patience’, placed in the central core for the nursing group, are not mentioned by the healthcare technicians' group. Likewise, the words ‘plaster’, ‘technique’, ‘examination’, and ‘laboratory’, appeared only in the healthcare technicians' group: the first three in the contrast zone and the last one in the second periphery.

The analysis of similarities allows us to visualize the relationship between the various words described by the students. Hence, we are more able to form an understanding of how each group of students structured their representation. It is important to note that the analysis

of similarities does not definitively conclude the centrality of any specific element. At most, it allows for hypotheses about this centrality.

Figure 1a and Figure 1b

Prototypical analysis of socio-professional representations for the two groups: nurses (*n* = 562) and healthcare technicians (*n* = 133).

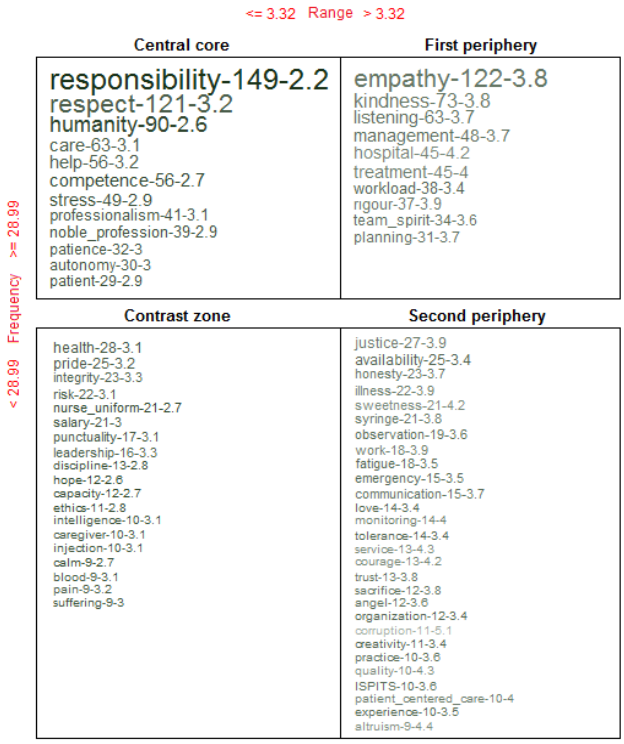


Figure 1a: Nursing group

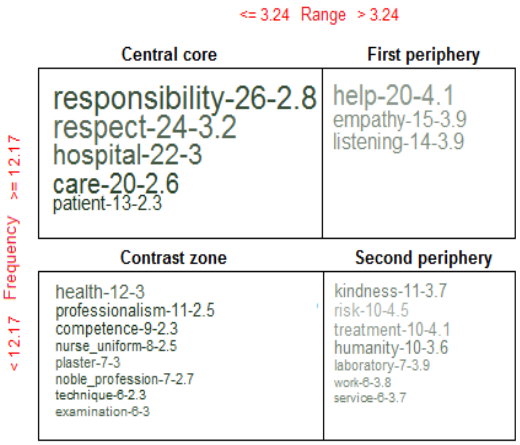


Figure 1b: Healthcare technician group

Note: Figure 1 presents a prototypical analysis of socio-professional representations for two groups: nurses (Figure 1a) and healthcare technicians (Figure 1b). Both figures are organized into four zones: central core, first periphery, second periphery, and contrast zone.

Figure 1a shows the terms distributed across the four zones based on their mean frequency of citation (28.99) and mean rank of appearance (3.32). To ensure that the presence of terms was not due to chance, the selected binomial threshold was a minimum of 9 participants.

Figure 1b shows the terms distributed across the four zones based on their mean frequency of citation (12.17) and mean rank of appearance (3.24). To ensure that the presence of terms was not due to chance, the selected binomial threshold was a minimum of 6 participants.

For each term, the figures present:
1. Frequency of citation: The number of times each term was cited.
2. Mean rank of appearance: The relative importance of each term within the socio-professional representation.

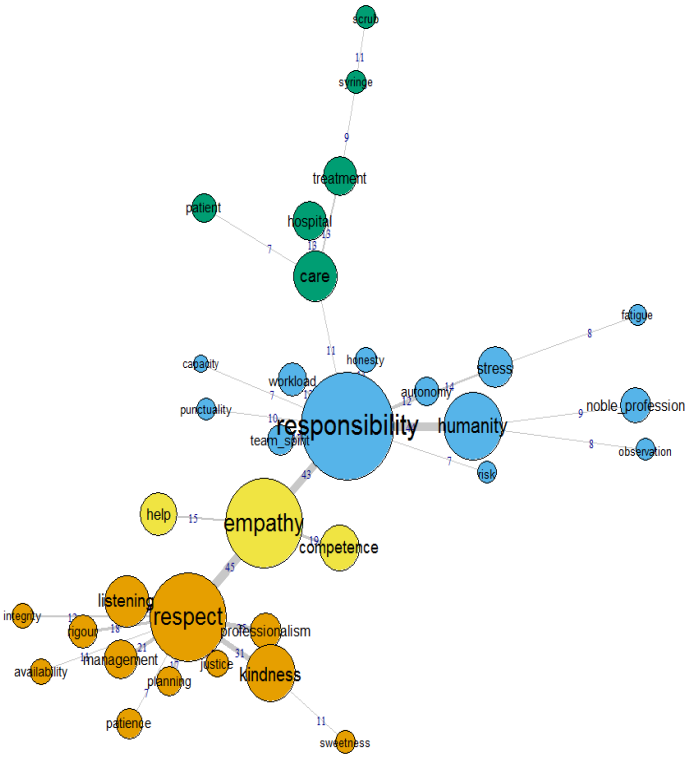
Similarity Analysis

The analysis of the similarity tree for the group of nurses (see Figure 2a) reveals an organization of the nursing profession's representation around four communities: responsibility, respect, empathy, and care. Remarkably high co-occurrence frequencies are observed between the words ‘respect’ and ‘empathy’ (45), between ‘empathy’ and ‘responsibility’ (43), and between ‘responsibility’ and ‘humanity’ (44). The nursing students associate the notion of ‘responsibility’ on one hand, with terms related to adverse working conditions such as stress, workload, risk, and fatigue, and on the other hand, with certain attitudes and qualities related to the individual themselves, such as empathy, humanity, honesty, team spirit, and punctuality.

The representation of the group of healthcare technicians is also constructed around four communities (see Figure 2b): responsibility, respect, care, and hospital. The first three notions are similar to those of the nursing group, with some differences in the number of terms composing each community and their distribution within it. The term ‘responsibility’ for the group of healthcare technicians is associated with five notions: respect, help, health, humanity, and team spirit. In contrast to the nursing group, the notions of ‘fatigue’ and ‘risk’ are associated with the terms ‘care’ and ‘hospital’, respectively.

Figure 2a & Figure 2b

Maximum trees constructed from student responses using the Fruchterman and Reingold (1991) algorithm



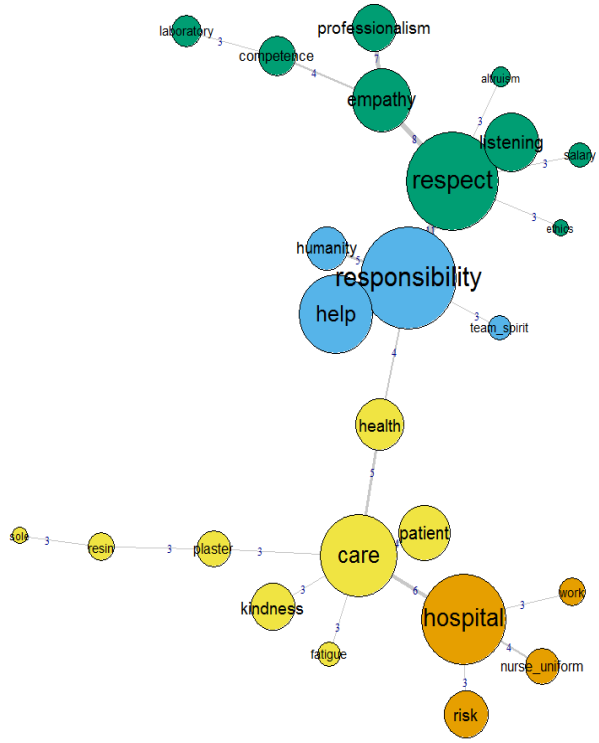


Figure 2a: Nursing group

Figure 2b: Healthcare technician group

Note: Figure 2a presents the maximum tree for the nursing student group, while Figure 2b shows the maximum tree for the healthcare technician group. The graphs are constructed using threshold 7 for the nursing group (only links with a value greater than or equal to 7 are kept in the graph) and threshold 3 for the health technicians group (only links with a value greater than or equal to 3 are retained in the graph). Each set of disks of the same color forms a community identified by the "edge betweenness community" method, as implemented in the IRaMuTeQ software (version 0.7 alpha 2). The area of the disks is proportional to the number of occurrences, while the numbers on the lines connecting two words correspond to the frequency of co-occurrences.

In order to highlight the observed differences between these two groups, we compared the frequency of occurrence of each term using a Chi-squared test and compiled the significant results in Table 2.

The group of healthcare technicians seems to focus more on practical aspects related to specific environments such as ‘hospital’, ‘techniques’, and clinical procedures like ‘examinations’ and handling ‘plaster’. Conversely, students in the nursing group place more emphasis on values, professional skills, and personal qualities necessary to practice their profession. They also seem to be aware of constraints related to the work environment, such as stress or inherent job risks. These observed differences may reflect distinct expectations, perceived responsibilities, and concerns of each group regarding their future profession.

Table 2

Chi-square analysis between the terms mentioned in free association and the groups

Items	p	Nurses	Healthcare Technicians
Hospital	.004	−	+
Technique	.001	−	+
Examination	.009	−	+
Laboratory	.000	−	+
Plaster	.000	−	+
Empathy	.003	+	−
Humanity	.006	+	−
Availability	.018	+	−
Integrity	.038	+	−
Honesty	.013	+	−
Rigour	.003	+	−
Autonomy	.001	+	−
Stress	.005	+	−
workload	.029	+	−

Note: Table 2 presents the results of the chi-square analysis between the terms mentioned in free association and the two groups of participants: Nurses and Healthcare Technicians. The "p" column indicates the p-values for the chi-square tests, with significance determined at the α=0.05 level. The direction of variation is indicated by the symbols "+" (indicating that the term is significantly more present in the corresponding group) and "−" (indicating that the term is significantly more absent in the corresponding group). All terms listed show a statistically significant difference between the two groups at this significance level.

DISCUSSION

In light of our results, it appears that both groups of students share a certain vision regarding their future professions, as some elements constituting the core (responsibility, respect, care, and patient) and the peripheral system (empathy, listening) are common to both groups.

The central core of the nursing students' group consisted of 12 notions, compared to 5 notions for the group of healthcare technicians. In this regard, Rouquette & Rateau (1998, p.36) consider that two representations are different if and only if two central cores of the representation are not identical. Similarly, Abric (1987, p. 66) specifies that a difference is noted when a single central element varies, is absent, or is additional. Therefore, even with similar elements in terms of the content of their representations, it can be concluded that the two groups of students have different socio-professional representations.

The main difference lies in professional values and tasks performed. Nursing students significantly emphasize terms related to qualities and values inherent in the nursing profession, whereas healthcare technicians significantly associate terms related to specific technical tasks. This tends to suggest that for the latter group, the notion of 'healthcare technician profession' is limited to a technicist vision.

Our results highlight socio-professional representations largely dominated by the notion of 'responsibility'. This notion is a strong value emphasized by 26.51% of nursing students (*n*=149) compared to 19.55% of healthcare technician students (*n*=26). When discussing their future profession, both groups of students consider the different situations in which they might be called upon to account for their actions, take responsibility, and bear the consequences. This demonstrates the importance of their involvement related to the practice of their future profession. This result aligns with a study by Moliner (1998), which highlights that 96% of nursing students reject the idea that a nurse would not be aware of their responsibilities.

The prominence of the notion of responsibility in the structure of representations differs between the two groups. The nursing students associate the concept of 'responsibility' with terms related both to skills and values such as empathy, honesty, and humanity, and to the adverse effects of the professional environment: stress, workload, risk, and fatigue. The observed results among the nursing students are similar to the findings of Brodie et al. (2004), who illustrates that many British nursing students found clinical practice extremely stressful. According to that study, sources of stress are associated with immense responsibilities, heavy workload, long working hours, staff shortages, and low morale. Regarding the group of healthcare technicians, we came to the conclusion that 'responsibility' is associated with compliance with rules, humanity in care, and team spirit.

From the perspective of the healthcare technician group, 'care' revolves around the hospital setting. The presence of the concept 'hospital' in the central core and its significance (p = .004) might be justified by the technical nature of this group whose functions are primarily carried out in a hospital environment. This finding is consistent with the data from another study conducted among undergraduate nursing students, which reveals a representation largely centered on hospitals (Mendes et al., 2016). It's within the training settings and under the influence of learning environments that social interactions contribute to the construction and maturation of socio-professional representations among nursing students (Piaser & Ratinaud, 2010; Van Iersel et al., 2016). It goes without saying that paramedical

students, within their clinical learning, are exposed to various healthcare facilities providing preventive, curative, educational, and rehabilitative care. While certain specialties in the healthcare field are more hospital-focused in their clinical practices, expanding the concept of healthcare becomes essential to promote a holistic view of both individual and collective health issues, integrating health promotion practices (Zoboli & Schveitzer, 2013). For comparison purposes, we cite the results of a study regarding the perceptions of nursing students upon completion of their training, which, beyond the hospital context, emphasized the concepts of ‘prevention’ and ‘research’ (Bastias et al., 2020).

Our research findings highlight the major role played by the relational dimension in the socio-professional representation of the nursing group. This group significantly emphasized empathy (p = .003) and availability (p= .018). Certainly, professional practice relies not only on mastering procedural skills but also on non-technical skills. Therefore, healthcare technicians, just like nursing students, should internalize the qualities, norms, and attributes inherent in their future profession to establish and maintain a high-quality nurse-patient relationship. The internalization of these professional values during the training process is essential for the development of their professional identity (Iacobucci et al., 2013; Larson et al., 2013).

Similarly, the concept of ‘autonomy’ is more prominent among the nursing group (p = .001). However, this professional skill matters less to the group of healthcare technicians. In their study, Bastias et al. (2020) also reported that nursing students at the end of their training emphasized their autonomy in relation to physicians. According to Guimelli & Jacobi (1990), the legal recognition of the nursing profession ‘proper role’ has contributed to the development of nurses' autonomy, consequently altering their professional representations. No one can deny the history of the nursing profession marked by subordination to medicine. In fact, the very first nursing schools had a mission to train professionals whose role was primarily to execute the techniques prescribed by physicians (Walter, 1998, p. 93). Although nursing has significantly evolved, the profession still faces challenges in asserting its professional autonomy (Warchol, 2007). The repercussions of its submission to the medical field are still evident. For instance, the perceptions of certain paramedical students have been primarily rooted in executing medical prescriptions rather than embracing their own proper role (Brodie et al., 2004).

The similarity tree shows that the nursing group associates the concept of autonomy with that of ‘responsibility’. This result aligns with findings from a study targeting midwives'

perceptions. They attributed characteristics such as autonomy, professional independence, and responsibility to their profession (Frégonèse & Ratinaud, 2015). In this regard, Magnon & Dechanoz (1995) consider nurses' proper role as "the function of the nurse which recognizes autonomy, the ability to make judgments, and take initiative. It involves taking responsibility" (p. 171). Hence, the responsibility inherent in the nursing profession is closely linked to the notion of autonomy. Furthermore, as part of the professionalization process, supervisors should allow a certain degree of freedom to nursing students and particularly to healthcare technicians in their learning environment, aiming to guide them toward becoming autonomous, responsible, and reflective practitioners (French Ministry of Health, 2009).

Limitations of the Study

One of the main limitations of this study is the scarcity of previous research dealing with socio-professional representations among categories of paramedical students. This makes it difficult to compare the results in this study with others. Additionally, the study was limited to nursing students from a single region of Morocco, which hinders the generalization of the results. It is, therefore, recommended that future research includes a national sample.

CONCLUSION

Although both groups of students share similarities in their professional representations, the central and peripheral elements as well as the contents of the maximum trees are not homogeneous. This leads us to conclude that the two subgroups of the population represent their future professions differently.

Firstly, our results highlight that students in the nursing group expected to face strenuous and stressful work. They portrayed nurses as autonomous professionals who respect patients. They also acknowledge that certain professional and interpersonal qualities are fundamental to their future profession. Additionally, our findings emphasize that students in the healthcare technician group emphasized the hospital setting as the preferred environment for providing care. Concepts related to clinical practice are highlighted by students in this group.

Given the absence, to the best of our knowledge, of studies addressing the socio-professional representations of nursing students in Morocco, this research has contributed to generating new knowledge. These findings could certainly have implications for nursing sciences in terms of education, policies, and research.

Firstly, it is the responsibility of teaching staff and supervisors during internships to implement teaching/learning activities based on interdisciplinarity. This approach can ensure the management of socio-professional representations, promote the sharing of values and knowledge specific to each specialty, and contribute to the co-construction of a professional identity with shared values within the profession. In this regard, we propose that for certain theoretical and practical training modules, students from both groups are mixed in common core classes. This would allow optimal collaboration in the field, increase the sense of professional belonging, and improve consistency in care delivery. Furthermore, policymakers in the field of nursing sciences need to better understand students' concerns regarding stressful situations and the responsibilities associated with their future profession. This understanding would help in implementing strategies aimed at creating a clinical environment conducive to learning and less stressful for students. Finally, our results could also serve as a basis for future research allowing for a more in-depth analysis. This further exploration should highlight the connections between practices common to both categories of students and their socio-professional representations based on cross-cutting concepts such as hygiene, hand-washing (Salès-Wuillemin et al., 2011), and therapeutic patient education. It would also be interesting to consider research aiming to assess the representations of both groups of students before and after engaging in a common practice on the same subject (Morlot & Salès-Wuillemin, 2008).

STATEMENTS AND DECLARATIONS

No funding was provided for conduct of the study and/or preparation of the paper.
There was no relevant conflict of interest for all authors.

ACKNOWLEDGMENTS

The authors wish to thank all students who participated in the study.

REFERENCES

Abric, J. C. (1976). *Jeux, conflits et représentations sociales* [Games, conflicts and social representations] [Unpublished doctoral dissertation].Université de Provence.

Abric, J. C. (1987). *Coopération, compétition et représentations sociales* [Cooperation, competition and social representations]. Del Val.

Abric, J. C. (1994). *Pratiques sociales et représentations* [Social practices and representations]. PUF.

Abric, J. C. (2005). La recherche du noyau central et de la zone muette des représentations sociales [The search for the central core and the silent zone of social representations]. In J. C. Abric (Ed.), *Méthodes d'études des représentations sociales* [Methods of studying social representations] (pp. 59-80). Érès. https://doi.org/10.3917/eres.abric.2003.01.0059

Alshutwi, D. S., Alharbi, M., Almutairi, D., & Alotaibi, R. (2021). Perceptions toward the Nursing Profession to Predict Attrition Factors among Female Saudi Nursing Students: Implications to Enrolment and Drop-Out. *International Journal of Innovative Research in Medical Science*, *6*(9), 560-568. https://doi.org/10.23958/ijirms/vol06-i09/1209

Asloum, N., & Bedoussac, L. (2020). Analyse des représentations sociales des enseignants.es du «produire autrement» vis-à-vis des directives ministérielles [Analysis of teachers' social representations of 'producing otherwise' in relation to ministerial directives]. *Éducation relative à l'environnement. Regards-Recherches-Réflexions*, *15*(2).https://doi.org/10.4000/ere.5788

Bastias, F., Giménez, I., Fabaro, P., Ariza, J., &Caño-Nappa, M. J. (2020). Social representations of nurses. Differences between incoming and outgoing Nursing students. *Invest EducEnferm*, *38*(1):e05.https://doi.org/10.17533/udea.iee.v38n1e05

Bataille, M. (2000). Représentation, implicitation, implication : des représentations sociales aux représentations professionnelles [Representation, implicitation, implication ; from social representations to professional representations]. In C. Garnier & M. L. Rouquette (Eds.), *Les Représentations en éducation et formation* (pp.165-189). Éditions nouvelles.

Becouze, O., Chauchon, C., & Salomon, N. (1996). Des représentations du métier à la construction de l'identité professionnelle [From representations of the profession to the construction of a professional identity]. *Recherche en soins infirmiers*, *45*, 147-153.

Boittin, I. (2002). Étudiants en soins infirmiers de deuxième année. Crise identitaire: «La mise à l'épreuve des motivations» [Second-year nursing students: Identity crisis - 'Testing motivations']. *Recherche en soins infirmiers*, *68*, 66-92. https://doi.org/10.3917/rsi.068.0066

Bonardi, C., & Roussiau, N. (1999). *Les représentations sociales* [The social representations]. Dunod.

Brodie, D. A., Andrews, G. J., Andrews, J. P., Thomas, G. B., Wong, J., & Rixon, L. (2004). Perceptions of nursing: confirmation, change and the student experience. *International journal of nursing studies*, *41*(7), 721-733. https://doi.org/10.1016/j.ijnurstu.2004.02.009

Degenne, A., & Verges, P. (1973). Introduction à l'analyse de similitude [Introduction to similarity analysis]. *Revue Française de Sociologie*, *14*(4), 471-512. https://doi.org/10.2307/3320247

Doise, W. (1990). Les représentations sociales [The social representations]. In R. Ghiglione, C. Bonnet & J.F. Richard (Eds.), *Traité de psychologie cognitive* (pp. 113-174). Dunod.

Dos Santos Lima, R. B., de Araújo Dias, M. S., Brito, M. D. C. C., do Vale Silva, A., da Silva, L. M. S., & Coutinho, J. F. V. (2018). Social representations of students in the construction of the professional identity of nurses. *Rev Rene*, *19*(1), 41. https://doi.org/10.15253/2175-6783.20181932468

Dubar, C. (2010). *La socialisation: Construction des identités sociales et professionnelles* [The socialization: construction of social and professional identities] (4e éd.). Armand Colin.

Fasanelli, R., Piscitelli, A., & Galli, I. (2020). Social Representations of Covid-19 in the framework of Risk Psychology. *Papers on Social Representations*, *29*(2), 8.1-8.36.https://www.iris.unina.it/retrieve/handle/11588/832152/384904/PSR_COV_19-1182-2-10-20201231.pdf

Flament, C., & Rouquette, M. L. (2003). *Anatomie des idées ordinaires: comment étudier les représentations sociales* [Anatomy of ordinary ideas: How to study social representations]. Armand Colin.

Fraysse, B. (2000). La saisie des représentations pour comprendre la construction des identités [The capture of representations to understand the construction of identities]. *Revue des sciences de l'éducation*, *26*(3), 651-676. https://doi.org/10.7202/000294ar

Frégonèse, C., & Ratinaud, P. (2015). Connaissance des représentations professionnelles de la profession de sage-femme [Understanding professional representations in the midwifery profession]. *La revue sage-femme*, *14*(1), 7-13. https://doi.org/10.1016/j.sagf.2014.12.003

French Ministry of Health. (2009). *Annexe III. Arrêté du 31 juillet 2009 relatif au diplôme d'Étatd'infirmier* [Decree of July 31, 2009 relating to the State Nursing Diploma]. https://solidarites-sante.gouv.fr/IMG/pdf/arrete_du_31_juillet_2009.pdf

Fruchterman, T. M., & Reingold, E. M. (1991). Graph drawing by force-directed placement. *Software -Practice and experience*, *21*(11), 1129-1164. https://doi.org/10.1002/spe.4380211102

Gandon, L., & Hardy-Massard, S. (2019). Modification des représentations sociales des métiers d'infirmier et d'animateur socioculturel chez des étudiants grâce à une action de santé publique menée en interdisciplinarité [Modification of the social representations of the professions of nurse and sociocultural coordinator among students thanks to a public health action carried out in interdisciplinarity]. *Pratiques Psychologiques*, *25*(1), 79-100. https://doi.org/10.1016/j.prps.2018.06.002

Guimelli, C., & Jacobi, D. (1990). Pratiques nouvelles et transformation des représentations sociales [New practices and transformation of social representations]. *Revue internationale de psychologie sociale*, *3*(3), 307-334.

Iacobucci, T. A., Daly, B. J., Lindell, D., & Griffin, M. Q. (2013). Professional values, self-esteem, and ethical confidence of baccalaureate nursing students. *Nursing Ethics*, *20*(4), 479-490. https://doi.org/10.1177/0969733012458608

Jodelet, D. (1989). *Les représentations sociales* [Social representations]. PUF.

Jodelet, D. (2003). Représentations sociales : un domaine en expansion [Social representations: a growing field]. In D. Jodelet (Ed.), *Les représentations sociales* (pp. 45-78).PUF. https://doi.org/10.3917/puf.jodel.2003.01.0045

Jubas, K., & Knutson, P. (2012). Seeing and be (liev) ing: How nursing and medical students understand representations of their professions. *Studies in the Education of Adults*, *44*(1), 85-100. https://doi.org/10.1080/02660830.2012.11661625

Lacassagne, M. F., Salès-Wuillemin, É., Castel, P., & Jébrane, A. (2001). La catégorisation d'un exogroupe à travers une tâche d'association de mots [The categorization of an outgroup through a word association task]. *Papers on Social Representations*, *10*(7), 1-7.11.https://psr.iscte-iul.pt/index.php/PSR/article/view/276/241

Larson, J., Brady, M., Engelmann, L., Perkins, B. I., & Shultz, C. (2013). The formation of professional identity in nursing. *Nursing education perspectives*, *34*(2), 138-45. https://doi.org/10.1097/00024776-201303000-00016

Lebart, L., & Salem, A. (1994). *Statistique textuelle* [Textual Statistics]. Dunod.

Lovan, S.R. (2009). *Comparing perceptions of the nursing profession among associate and baccalaureate nursing students and registered nurses* [Doctoral dissertation, College of

Education and Behavioral Sciences, University of Louisville]. https://digitalcommons.wku.edu/nurs_fac_pub/54

Magnon, R., &Dechanoz, G. (1995). *Dictionnaire des soins infirmiers* [Nursing dictionary]. AMIEC.

Maillet-Contoz, J., Combaz, G., & Morin-Messabel, C. (2019). Les représentations professionnelles des étudiant·e·s en soins infirmiers: des représentations genrées [Professional representations of nursing students: gendered representations]. *L'orientation scolaire et professionnelle,48*(4), 581-609. https://doi.org/10.4000/osp.11551

Marková, I. (2003). *Dialogicality and social representations: The dynamics of mind*. Cambridge University Press.

Mendes, F. R. P., Zangão, M. O. B., Gemito, M. L. G. P., & Serra, I. C. C. (2016). Social Representations of nursing students about hospital assistance and primary health care. *Rev Bras Enferm*, *69*(2), 321-8. https://doi.org/10.1590/0034-7167.2016690218i

Mias, C., & Piaser, A. (2016). Les représentations professionnelles [Professional representations]. In G. Lo Monaco, S. Delouvée, & P. Rateau (Eds.), *Les représentations sociales. Théories, méthodes et applications* (pp. 319-322). De Boeck.

Moliner, P. (1998). Dynamique naturelle des représentations sociales [Natural dynamics of social representations]. *Les Cahiers Internationaux de Psychologie Sociale, 40,* 62-70.

Morlot, R., & Salès-Wuillemin, E. (2008). Effet des pratiques et des connaissances sur la représentation sociale d'un objet : application à l'hygiène hospitalière [Effects of the Practices and Knowledge on the Social Representation of an Object: The Case of Hospital Hygiene]. *Revue Internationale de Psychologie Sociale*, *21*(4), 89-114.https://www.cairn.info/revue-internationale-de-psychologie-sociale-2008-4-page-89.htm

Moroccan Ministry of Health. (2013). *Décret No. 2-13-658 relatif aux instituts supérieurs des professions infirmières et techniques de santé* [Decree No. 2-13-658 on Institutes of Nursing and Health Technologies]. http://www.sgg.gov.ma/BO/AR/2013/BO_6195-bis_Ar.pdf

Moroccan Ministry of Health. (2015). *Guide des Instituts Supérieurs des Professions Infirmières et Techniques de Santé* [Guide to Institutes of Nursing and Health Technologies]. http://drh.sante.gov.ma/Lists/Actualites/Attachments/180/ispits%2030%2003%202016.pdf

Moscovici, S. (2001). Why a theory of social representation? In K. Deaux & G. Philogène (Eds.), *Representations of the social: Bridging theoretical traditions* (pp. 18-61). Blackwell Publishers.

Moscovici, S. (2004). *La psychanalyse, son image et son public* [Psychoanalysis, its image and its public]. PUF.https://doi.org/10.3917/puf.mosco.2004.01

Novais, S., Príncipe, F., & Mota, L. (2020). The social representation of nursing and being nurses: perspective of nursing students and tutors. *Millenium*, *2*(13), 51-60. https://doi.org/10.29352/mill0213.05.00326

Lautier, N. (1994). La compréhension de l'histoire: un modèle spécifique [Understanding History: A Specific Model]. *Revue française de pédagogie*, 106, 67-77. https://doi.org/10.3406/rfp.1994.1274

Piaser, A. (1999). *Représentations professionnelles à l'école. Particularités selon le statut: enseignant, inspecteur* [Professional representations at school. Particularities according to status: teacher, inspector] [Doctoral dissertation in Education and Training Sciences].Université Toulouse-Le Mirail.

Piaser, A., & Bataille, M. (2011). Of contextualised use of "social" and "professional". In M. Chaïb, B. Danermark& S. Selander (Eds.), *Education, Professionnalization and Social Representations* (pp. 44-54). Routlegde.

Piaser, A., & Ratinaud, P. (2010). Pensée sociale, pensée professionnelle : une approche singulière en Sciences de l'Education [Social thinking, professional thinking: a singular approach in Education Sciences]. *Les Dossiers des Sciences de l'Education*, *23*, 7-14.

Pozzi M., Fasanelli R., Marta E., Ellena A.M., Virgilio G., Di Taranto A., &Pistoni C. (2022).Social Representation of Family: A Comparative Study on Italian Young and Older Adults. *Journal of Family Issues*, *43*(3), 752-768. https://doi.org/10.1177/0192513X21994160

Prosen, M. (2022). Nursing students' perception of gender-defined roles in nursing: a qualitative descriptive study. *BMC Nurs*, *21*(1), 1-11. https://doi.org/10.1186/s12912-022-00876-4

Ratinaud, P. (2003). *Les professeurs et Internet. Contribution à la modélisation des pensées sociale et professionnelle par l'étude de la représentation professionnelle d'Internet d'enseignants du secondaire* [Teachers and the Internet: Contributing to the Modeling of Social and Professional Thoughts through the Study of Secondary School Teachers'

Professional Representation of the Internet] [Doctoral dissertation in Education Sciences]. Université de Toulouse-Le Mirail.

Rouquette, M. L., & Rateau, P. (1998). *Introduction à l'étude des représentations sociales* [Introduction to the study of social representations]. Presses universitaires de Grenoble.

Salès-Wuillemin, E., & Morlot, R. (2008). Evolution of social representation of communication's media: the case of Internet. *Illetisim,1,* 343-359.https://halshs.archives-ouvertes.fr/halshs-00596066

Salès-Wuillemin, E., Morlot, R., Fontaine, A., Pullin, W., Galand, C., Talon, D., & Minary-Dohen, P. (2011). Evolution of nurses' social representations of hospital hygiene: From training to practice. *European Review of Applied Psychology*, *61*(1), 51-63. https://doi.org/10.1016/j.erap.2010.06.001

Teiger, C. (1993). Représentations du travail, travail de la Représentation [The work of representation and representations of work]. In A. Weill- Fassina, A., P. Rabardel, & D. Dubois (Eds). *Représentations pour l'action* (pp. 311-344). Octarès.

Van Iersel, M., Latour, C. H., De Vos, R., Kirschner, P. A., & Scholte Op Reimer, W. J. M. (2016). Nursing students' perceptions of community care and other areas of nursing practice–A review of the literature. *International Journal of Nursing Studies*, *61*, 1-19. https://doi.org/10.1016/j.ijnurstu.2016.05.011

Vergès, P. (1992). L'évocation de l'argent: une méthode pour la définition du noyau central d'une représentation [The evocation of money: a method for defining the central core of a representation]. *Bulletin de psychologie*, *45*(405), 203-209.https://www.persee.fr/doc/bupsy_0007-4403_1992_num_45_405_14128

Vergès, P. (2001). L'analyse des représentations sociales par questionnaires [Analysis of social representations using questionnaires]. *Revue française de sociologie*, *42*(3), 537-561. https://doi.org/10.2307/3323032

Walter, B. (1998). *Le savoir-infirmier: Construction, évolution, révolution de la pensée infirmière* [Nursing knowledge: the construction, evolution and revolution of nursing thought]. Lamarre.

Warchol, N. (2007). La consultation infirmière: un pas vers l'autonomie professionnelle [Nursing consultation: a step towards professional autonomy]. *Recherches en soins infirmiers*, *91*(4), 76-96. https://doi.org/10.3917/rsi.091.0076

Zoboli, E. L. C. P., & Schveitzer, M. C. (2013). Nursing values as social practice: a qualitative meta-synthesis. *Revista Latino-Americana de Enfermagem*, *21*(3), 695–703. https://doi.org/10.1590/s0104-11692013000300007

ABDELMONIM EL FADELY is a PhD student at Didactics of Science and Pedagogical Engineering. He is a member of the Laboratory for Didactics, Education and Training (LIRDEF) - Normal Graduate School, Cadi Ayyad University, Marrakech, Morocco. Additionally, he teaches at the Institute of Nursing and Health Technologies (ISPITS), Marrakech (Morocco). His work concerns social representations, reflective practice, professionalization, and professional identity. Email: abdelmonim.elfadely@ced.uca.ma

MOHAMED AIT BABRAM is a Full Professor of Mathematics at the Faculty of Science and Technology, Cadi Ayyad University, Marrakech, Morocco. He is a founding member of the Mathematics and Population Dynamics Laboratory. His research focuses on mathematical and computational modeling of complex systems, with a particular emphasis on data science. Email: aitbabram@gmail.com

SAMIHA LIDRISSI-HASSANI is a PhD Student at Didactics of Science and Pedagogical Engineering. She is a member of the LIRDEF Laboratory - Normal Graduate School, Cadi Ayyad University, Marrakech, Morocco. Her studies focus on professional representations, pedagogical engineering, health education and promotion in schools, and teacher practices in health education. Email: samiha.lidrissi94@gmail.com

RACHEL MORLOT holds a PhD in social and work psychology. She is a member of the laboratory Psy-DREPI (UR-7458) at the University of Bourgogne, Dijon, France. Her research mainly concerns attitude and social representations phenomena, focusing more particularly on intergroup relations (stereotype and discrimination) and on social perceptions about health and care situations. Email: Rachel.Morlot@u-bourgogne.fr

SABAH SELMAOUI is a Full Professor in Didactics and Educational Sciences at the Normal Graduate School, Cadi Ayyad University, Marrakech, Morocco. Her research interests encompass professional development and pedagogical practices for teachers, conceptions and

learning difficulties, human genetics, health education, environmental education, and sustainable development. Email: sa.selmaoui@uca.ac.ma

BOUJEMAA AGORRAM is a Full Professor in Biology Didactics and Genetics at the Normal Graduate School, Cadi Ayyad University, Marrakech, Morocco, and member of the LIRDEF laboratory. Her research interests include science didactics, pedagogical engineering, learning assessment, ICT in education, social representations, and school violence. Email: bo.agorram@uca.ma

Appendix: Calculation of binomial thresholds

To study the structure of the socio-professional representations of nursing students and healthcare technicians, we employed prototypical analysis, developed by Vergès (1992) and based on the work of Abric (2005). This method considers the frequency of word occurrences and their rank of importance, thereby constructing a four-cell table: the central core, the first periphery, contrasting elements, and the second periphery. The higher the frequency of a word and its rank of importance, the closer it is to the central core.

The thresholds used to determine the central and peripheral zones are the average rank of importance and the binomial threshold for the frequency of occurrence. The binomial threshold, or threshold k, is determined by a binomial test, which evaluates the probability (p) that a certain number of individuals (k) produced the same word. This test relies on the number of subjects, the average number of associated terms per subject, and the total number of distinct terms. Only words produced with a probability $p < 0.01$ are considered.

Table 3. Calculation of binomial threshold for the group of nurses:

Number of distinct words	769			
Average number of words per person	5.79			
Number of subjects	562			
k	0.00752925	**Binomial**	**p-value**	**%**
0		0.01430060	0.98569940	0.00
1		0.07527186	0.92472814	1.27
2		0.20501742	0.79498258	2.53

3		0.38875323	0.61124677	3.80
4		0.58354927	0.41645073	5.06
5		0.74847136	0.25152864	6.33
6		0.86462085	0.13537915	7.59
7		0.93460965	0.06539035	8.86
8		0.97144510	0.02855490	10.13
9		0.98864666	0.01135334	11.39
10		0.99586318	0.00413682	12.55
11		0.99861049	0.00138951	13.70

Note: Table 3 presents the calculation of the binomial threshold for the group of nurses. The value of k represents the probability that a given word is selected by an individual in our sample, assuming each word has an equal chance of being selected. The binomial p-value column shows the cumulative probability that the observed frequency of a word, up to each threshold, is due to chance. The % column indicates the proportion of the population represented up to each threshold value.

Table 4. Calculation of binomial threshold for the group of healthcare technicians:

Number of distinct words	359			
Average number of words per person	5.99			
Number of subjects	133			
k	0.0166852	**Binomial**	**p-value**	**%**
0		0.11721303	0.88278697	0.00
1		0.37052593	0.62947407	1.27
2		0.64218925	0.35781075	2.53
3		0.83494654	0.16505346	3.80
4		0.93674095	0.06325905	5.06
5		0.97941593	0.02058407	6.33
6		0.99420912	0.00579088	7.59
7		0.99857024	0.00142976	8.86
8		0.99968635	0.00031365	10.13

Note: Table 4 presents the calculation of the binomial threshold for the group of healthcare technicians. The value of k represents the probability that a given word is selected by an individual in our sample, assuming each word has an equal chance of being selected. The binomial p-value column shows the cumulative probability that the observed frequency of a word, up to each threshold, is due to chance. The % column indicates the proportion of the population represented up to each threshold value.