

SIMUCARE-immersion 360° immersion with the partner patient

to use the concepts of the paediatric communication skill in initial medical and paramedical training

METHODOLOGICAL GUIDE



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Presentation of partners

The Coimbra School of Nursing (ESEnfC)

The Higher School of Nursing of Coimbra (ESEnfC), heir to the oldest nursing training in Portugal (since 1881), is a public institution recognised nationally and internationally for its quality and innovation in the healthcare system and in society. The ESEnfC is committed to the humanistic, scientific, technical and cultural training of socially recognised professionals, the promotion of accredited research, the dissemination of knowledge and the provision of services.

The ESEnfC is home to the Unité de Recherche en Sciences de la Santé : Soins Infirmiers (UICISA: E), a research unit funded by the FCT since 2004. UICISA: E develops R&D activities in nursing and related health sciences, at an interdisciplinary and international level, in order to provide a sustainable and socially responsible response to complex issues related to health promotion, disease prevention and care delivery. In response to local and global health challenges, IUCIAS: E conducts research focused on priority areas and has been successful in attracting funding from a variety of sources through national and international networks. UICISA: E contributes to the advancement of knowledge and promotes quality healthcare. Its objectives include the development of medical devices/technical procedures, the training of researchers, the management of interdisciplinary research programmes, and the production, dissemination, synthesis and implementation of scientific knowledge.

Currently, the ESEnfC has more than 225 faculty members and more than 70 administrative staff. With reference to the academic year 2022/2023, the ESEnfC had 1941 students enrolled: 1444 in the Bachelor of Nursing programme, 318 in the Master's programme, 43 in the postgraduate specialisation programme, 121 in the postgraduate programme and 15 in the Doctorate programme. In addition, there are 90 students on incoming mobility programmes. In 2022, UICISA:E counted: 99 undergraduate students on research integration rotations, 29 research fellows, 19 national and international researchers in advanced training, 218 integrated researchers and collaborators, and 13 projects funded at national or international level.

The «Iuliu Haţieganu» University of Medicine and Pharmacy in Cluj-Napoca

The «Iuliu Haţieganu» University of Medicine and Pharmacy in Cluj-Napoca is a university with a rich tradition of preparing professionals in the healthcare field. It is one of the most renowned universities in Romania. The UMFIH currently has more than 1,300 employees, in addition to 830 teaching staff. More than two-thirds of them carry out research activities on a part-time basis. The university currently has more than 9,000 students, over 3,500 of whom are foreign students. In addition to Romanian-language medical education, teaching has also been offered in English and French for some twenty years, attracting large numbers of students from around 63 countries. The Faculty of Medicine offers 6 degree programmes: Medicine, Nursing, Radiology and Medical Imaging, Balneo-Physiotherapy and Medical Recovery.

This facility has a centre for practical skills and medical simulation, providing enhanced learning and training opportunities for interdisciplinary healthcare teams. This learning targets both the technical aspects of clinical management and communication skills. The Centre for Practical Skills and Medical Simulation is part of the University's Department of Medical Education, with the following objectives: (1) initial and continuing training for interns and medical specialists; (2) improving medical teaching by introducing new learning techniques; (3) participating in medical research; (4) collaborating with hospitals and local and national health authorities to promote accreditation and certification of new standards for medical procedures.

INFOREF

Inforef is a non-profit organisation based in Liège that offers a range of activities and services to promote the use of digital technologies and European cooperation in the field of education.

INFOREF offers high-quality services at all levels of education, from primary school to adult training, stimulating the use of technology as a driver for improvement and innovation in learning and teaching. This includes both the creation of education systems based on e-Learning and open educational resources, and a training offer that prepares teachers to use software, digital tools and interactive platforms for educational purposes in their activities. With over twenty years' experience in managing European projects as a partner or coordinator, INFOREF has developed expertise in the administrative and financial management of such projects, as well as in the creation of coordination sites. In recent years, INFOREF has developed interactive e-learning platforms for adult education and higher education. Inforef has recently participated in several Erasmus+ projects in the medical and paramedical fields (SimuCarePro, SimuCarePro-CRM, ESafe, SimuCarePro-Immesion). These projects have enabled the development of innovative teaching tools and specific training courses aimed at improving the skills of healthcare professionals and students in these sectors. By working with European partners, Inforef has contributed to the creation of resources tailored to the needs of medical and paramedical professionals, encouraging the exchange of best practice and the adoption of digital technologies to enhance the quality of care and education in these fields.

HELMo

HELMo-the paramedical department-offers four bachelor's degrees, three specialisations and a master's degree in nursing sciences in partnership with the University of Liège and other Hautes Écoles. HELMoSiM, the department's simulation centre, comprises three simulation rooms equipped with several high-fidelity mannequins and a room dedicated to standardised/role-playing/partner patients. Simulation is used to develop the technical and non-technical skills and clinical judgement of nursing and midwifery students, as well as for in-service training for healthcare professionals. The expertise of our simulation teacher-trainers has led to the development of numerous projects financed by our own, regional or European funds (Erasmus+, Interreg, Win2wall). These projects aim to improve the quality of teaching methods and practices in healthcare simulation. Examples include the SimuCare-Pro, SimuCarePro-CRM, E-Safe and HEAL projects supported by the Erasmus+ programme. For over 15 years, HELMo Link asbl (formerly CRIG), which is attached to HELMo, has been developing applied research and continuing education activities in conjunction with HELMo's 5 initial training departments: IT & technical, paramedical, social, economic & legal, and pedagogical. HELMo Link has experience in drafting and implementing applied research projects financed by various European funds such as Interreg and Erasmus +.

Côte d'Azur University

The Patient and Public Partnership Innovation Centre is part of the Department of Teaching and Research in General Medicine, which has mobilised a «doctor-patient partner» partnership tandem in this research. These organisations are part of the Université Côte d'Azur, an I-DEX university, meaning that it is considered by the Ministry of Higher Education and Research to be an Initiative of Excellence. It is home to 35,000 students across 12 campuses and 28 training structures, offering 560 courses. It is unique in that it has created a dedicated health training and research ecosystem called Healthy. This ecosystem places the patient care partnership at the heart of its research policy. CI3P and DERMG are participants in the «Risks, Epidemiology, Territory, Information, Education, Health» (RETINES) interdisciplinary research laboratory in partnership with patients. A research laboratory that is creating a digital health ecosystem to complement the traditional healthcare system, with major programmes in which Immersion 360 is a coherent part, such as the SANURN project, which aims to offer health science students a digital curriculum during their studies. A training project in which the current stage consists primarily of training the trainers. CI3P, DERMG and RETINES are also involved in implementing a primary care health warehouse, P4DP, which will be linked to the health warehouses of the University Hospital Centres (CHU) and environmental data. A health warehouse that will be linked to a mobile health application/digital learning platform open to patients, relatives, health science students and practising professionals, «Avec p», with the aim of assessing their impact on health data, in which Immersion 360° is involved.

Faculty of Psychology, Speech Therapy and Education Sciences - University of Liège

The Faculty of Psychology, Speech Therapy and Educational Sciences (FPLSE) is one of 11 faculties at ULiège University, which has more than 28,000 students and more than 3,000 researchers . The FPLSE offers future psychologists, speech therapists and educationalists - some 3,000 students - a training programme characterised both by its concern for scientific rigour and by the diversity of approaches and areas of specialisation offered to students: family psychology, psychology of delinquency, social psychology of work and organisations, neuropsychology, clinical child psychology are just some of the many training modules that make up the Master's programme in Psychological Sciences. The Master's in Speech Therapy also offers students the chance to specialise in areas such as voice disorders, deafness and oral and written language disorders (including their neuropsychological aspects).

The Master's degree in Education Sciences, which is mainly taken by teachers who already have a degree, enables them to take further training in the fields of lifelong learning, intervention in schools and training early childhood professionals, to name but a few

The FPLSE is keen to enhance its teaching through various educational innovations. For example, it offers several Massive Open Online Courses (MOOCs) that have reached tens of thousands of clinicians or future clinicians in France, Switzerland, Canada and other countries. It has introduced immersive reality into its teaching, and simulation using this or more traditional methods (such as the simulated patient) is now part of the core curriculum. Simulation is used to develop communication skills, clinical judgement and technical skills. Our expertise in this field has led to several publications in international journals.

The aims of this guide

The aim of this guide, produced by the various partners involved in setting up the project, is to describe the stages and thinking that went into building the Simucare Immersion 360° platform. Firstly, it provides a theoretical framework identifying the reasons for the choice of problem. Secondly, it explains the method used to provide initial answers to the problem. The description of this methodology also aims to enable the reproduction of the teaching tools developed. Finally, the first results obtained from various users of the platform created as part of the project are discussed.

Introduction

Communication in care ²

This project aims to improve the communication skills of future nurses, doctors and psychologists working in paediatrics. Communication between patients and carers plays an important role in the care relationship. Appropriate communication enables the clinician to better understand the patient's situation (Neumann, 2009). This adequate communication is known as empathic communication, defined as «the willingness to understand the patient's perspective, emotions and their origins, and then to communicate this understanding to the patient, enabling the patient to act, in accordance with this understanding, in a way that is helpful to the patient» (Halpern, 2014; Hardman and Howick, 2019). Empathic communication has been identified as having an effect, significant, on pain and anxiety experienced by the patient (Howick et al. 2018) as well as patient outcomes (Kelley et al. 2014; Hojat, 2011; Elliott and Bohart, 2018). As Neumann and colleagues (2009) explain, the effects of empathic communication on the patient's physical and mental health stem from a virtuous circle between improving the quality of communication with the patient and developing a better understanding of their situation by the clinician.

This empathic communication is a key ingredient of person-centred approaches (PCA). PCAs are approaches that require: (1) identifying and understanding the patient's concerns, ideas, expectations, needs, feelings and functioning; (2) understanding the patient in his or her unique psychosocial context; (3) reaching a shared understanding of the problem and its treatment with the patient, in a way that is consistent with his or her values; (4) helping patients to share power by offering them meaningful involvement in their health-related choices (Epstein et al, 2005).

Given the importance of empathic communication within the healthcare relationship, this skill has been identified as an essential training target within healthcare (World Federation for Medical Education, 2015; APA, 2013). To achieve empathic communication, various interview techniques can be taught and then used by future clinicians (Van der Molen, Lang and Trower, 2013; Hill and Lambert, 2004; Hill, 2020). These techniques are the ingredients that will make it possible to explore the patient's perspective through active listening and thus develop empathy towards them, provide the necessary information, discuss the objectives of the proposed treatments or interventions and involve the patient in the decisions that concern them. These techniques include open and closed questions, the former allowing a broader, freer exploration of the patient's perspective than the latter, which provide specific information. Another interview technique is reformulation, which briefly repeats what the patient has said. In other words, this technique enables the clinician to convey to the patient his or her understanding of the situation . Reflecting feelings is another interview technique, similar to the previous one except that it targets the patient's feelings (Jeaken, 2017). Paradoxically, empathic communication and the associated interview techniques are rarely taught systematically in curricula (Choudhary and Gupta, 2015; EFPA, 2013). When they are, they are mainly taught in the traditional way, in ex cathedra lectures, despite the literature emphasising the importance of experiential teaching (Kolb and Kolb, 2009). If they are not taught across the board, they are taught even less in specific contexts such as paediatrics, which has its own specific features.

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³ The definitions of interviewing techniques are based on the work of Van der Molen, Lang and Trower (2013) and Hill and Lambert (2004) and Hill (2020).

The specificities of paediatrics 4

A number of specific factors come into play when it comes to paediatric communication. Firstly, a child's communication style is shaped by a variety of factors, including chronological age and developmental milestones, neurodevelopmental factors, personality, family and environmental context. To communicate effectively with children of all ages and their families, clinicians therefore need to have a clear understanding of the child's cognitive and communication developmental stages in order to develop an appropriate mode of communication (Fraser, 2017). The aim is to provide information at an understandable level, and successfully engage children in their own care (Bell & Condren, 2016). Indeed, high-quality care involves listening to children and involving them in the decision-making processes that affect them (Lambert et al., 2012).

However, studies show that children's participation during medical consultations is often limited. Children are almost always accompanied by their parent or an adult when they consult a clinician, and interactions are dominated by carers and this close carer (Damm et al., 2015). Children's participation during medical visits is therefore often minimal (Tran et al., 2022). This lack of involvement can unfortunately lead to problems of understanding and compliance in children. It is therefore essential to recognise that the child is the patient, at the centre of the relationship, alongside the carer.

This triadic consultation - where the clinician must simultaneously address the close caregivers and the children - presents unique challenges, as each party requires individualised attention (Kurtz & Silverman, 2016). Indeed, one of the specificities of communication in the paediatric setting is the presence of 'caregiver-caregiver close', 'caregiver-child' and 'caregiver-caregiver-child' dyads that collectively form a dynamic triadic relationship where each interaction offers potential for cooperation, but also for conflict influencing the therapeutic relationship (Lambert et al., 2012). Interactions involving triads introduce a multitude of unique factors to consider, such as the nature of information exchange between triad members and the potential for the formation of dyadic coalitions, in which a conversation between two triad members emerges and excludes the third member, the child. Caregivers and parents may, for example, unintentionally limit children's participation through interruptions, the use of technical language and the formation of dyadic conversational partnerships (Tran et al., 2022).

Close carers also act as substitutes and legal decision-makers for child patients, who generally do not have the legal capacity to make informed decisions until the age of 16 or 18. They are also the ones who report the child's medical history and symptoms, administer the prescribed treatments, and may even become very informed about the child's condition in the case of a chronic illness. However, this often leads them to speak on behalf of their child, even when the clinician is speaking directly to the child. This laudable behaviour can, however, be detrimental to the quality of the care provided, as children are sometimes the best reporters of their health experiences. Parental behaviour also explains children's tendency to participate minimally in healthcare interactions (Tran et al., 2022). Of course, the weight of the caregiver varies according to the child's stage of development. While communication early childhood tends to be more dyadic due to the limited communicative abilities of the young child (lenkins, 2024), as the child grows, the dyad tends to become a triad (Kaye et al., 2020). During paediatric consultations, it is therefore essential to implement various strategies to increase the child's participation, especially with the youngest children. This starts with direct dialogue with the child, actively inviting them to express themselves, rather than focusing solely on the parent(s) (Lambert et al., 2012). To do this, clinicians need to explicitly invite the child to participate and allow them time to answer questions. However, it is important to give the relative some space to express his or her concerns so that he or she can, in turn, give space to the child (Cahill & Papageorgiou, 2007). Finally, it cannot be assumed that all children, especially the youngest, will necessarily want to or be able to take part in their consultation. Asking young children if they would like to tell their story or if they would prefer their close carers to do so is one solution.

Training in paediatric communication 5

The specificities of paediatric communication therefore present other challenges for carers. Yet the literature reports a lack of training available for them.

For example, a systematic review (n = 8; Kaye et al., 2020) of the current state of communication training in a paediatric context, in this case limited to oncology, reports that despite the importance and specific features of communication in the paediatric context, there is little literature on the subject. In particular, they report that studies describing existing training courses do little to define the skills targeted, which is problematic given the importance of the triad specific to paediatrics. Thus, if this review concludes communication in a paediatric context, it focuses on the importance of specifying the targeted skills, the inclusion of experiential learning and the importance of leaving room for self-reflection and debriefing. Finally, it should also be noted that a large number of studies on paediatric communication training focus mainly on the positive effects in terms of information exchange and relational communication with parents and not with the child (Ammentorp et al., 2009; Harrington et al., 2007)

More studies involving children as active participants are therefore needed to better assess the effectiveness of paediatric communication training. In this respect, it is interesting to look at the studies carried out to improve empathy with the adult population. Here we will look at the benefits of immersive reality. We will then turn to the paediatric literature.

The use of immersion as a simulation tool ⁶

For many years, so-called simulation tools have been used to simulate certain clinical situations using a variety of media, ranging from simple role-playing games to devices involving complex real or virtual environments. Simulation enables the development of technical and non-technical skills (e.g. stress management and teamwork skills) and preparation for specific situations (such as working in emergency departments, Garber et al., 2024) or rare or critical situations (e.g. disaster management). Simulation thus enables learners to prepare for situations that they rarely encounter in everyday clinical practice. In this context, digital simulation is an innovative approach that uses virtual reality (VR) or 360° video technology (Immersion 360°, 1360°) to immerse learners in a realistic but safe simulated environment. With 360° immersion, learners cannot interact with the environment, as the scenario consists of a 360° video that can be viewed via a cardboard or screen. In virtual reality, a headset and controllers are used to interact with an interactive environment. These methods are particularly relevant to healthcare training, as they enable clinical situations to be recreated and made accessible in an immersive way, while encouraging practical learning and critical thinking in a safe environment.

Using immersion to teach empathic communication ⁷

Increasingly, we are seeing the simulation of certain symptoms or a set of difficulties, as we can see in the review by Goosse (2023). The aim of symptom or medical situation simulation is to help a person who is not experiencing a difficulty/situation to take on the perspective of the person who is. The aim here is to promote awareness of the experience of another person or group (Bertrand, Guegan, Robieux, McCall, & Zenasni, 2018).

More specifically, this allows specific health difficulties (e.g. auditory hallucinations; Chaffin & Adams, 2013) or a set of difficulties (e.g. age-related difficulties; Pacala, Boult, Bland, & O'Brien, 1995) to be simulated. The methods used for simulation can be diverse, ranging from simple earphones (Chaffin & Adams, 2013) to methods using more advanced technologies such as 360° immersion (I360°) or virtual reality (VR) (e.g. 360° Immersion, Imm360°: Goosse et al., 2023; Virtual Reality, VR: Formosa et al., 2018).

Whatever the medium, the advantage of simulations using more technological tools is that they allow multisensory immersion at lower cost (Herrera, Bailenson, Weisz, Ogle, & Zak, 2018; Peck, Seinfeld, Aglioti, & Slater, 2013; Shin, 2018). Generally speaking, the studies conducted to date reveal encouraging results on the empathy of the people who took part in the simulation towards the people experiencing the difficulties they embodied. For example, a study evaluating the impact of dementia simulation for health students using VR reveals a medium-sized positive impact (d = .51; Adefila, Graham, Clouder, Bluteau, & Ball, 2016). Another study reports a very large effect size on empathy and attitudes that psychology students may have towards people suffering from psychosis (Formosa, Morrison, Hill, & Stone, 2018).

However, other studies have also shown that while simulating difficulties can increase empathy, it can also have a negative impact on other variables, such as stereotypes (Brown et al. 2009; Goosse et al., 2023). These studies suggest that simulating difficulties or difficult situations alone may not be sufficient and that other teaching tools may need to be added.

In the specific context of training in communicative competence, two recent studies revealed that immersion followed by debriefing could have a positive impact on the quality of communication and empathy perceived by simulated patients of psychology students (Goosse et al., 2024); as well as on the empathy reported by nursing students (Goosse et al., 2024).

As far as empathy with children is concerned, there are still few studies to date. However, in studies using VR in which participants are immersed in the role of the child, there has been an increase in teachers' understanding of children's feelings, perceptions and needs (Katz, 1999) and in empathy and concern in mothers who have been immersed in the skin of a 4-year-old child treated aggressively by a virtual parent (Hamilton-Giachritsis, 2018). In a study using a brief 360° Immersion, adults (teachers, parents...) were immersed in the skin of a dyslexic child confronted with his reading difficulties in a library. This experience increased the participants' concern (Radu et al., 2021). Similarly, dental students who experienced a VR simulation from a child's point of view during a visit to the dentist showed an improvement in several dimensions. The Jefferson Empathy Scale (JSE) was used to measure levels of empathy before and after the intervention. The results showed a significant increase in empathy scores immediately after the intervention, although this effect diminished after three months. Students also reported improved confidence in communicating and interacting with children. The study concludes that VR can be an effective tool for improving empathy and self-perception skills in the management of paediatric patients, but regular review may be necessary to maintain these benefits (Hu & Lai, 2022).

Patient partnership and interdisciplinary care ⁸

Let's now turn to one of the main objectives of empathic communication in care - the creation of a genuine partnership with the patient.

Interdisciplinarity is defined as collaboration between people from several disciplines or professions (Buret, 2020). In this partnership, it is now recommended (Pomey, 2015) that a new category of professional should be specifically included: the expert patient. Expert patients are recognised as experts in their lives with the disease (Pomey, 2015); in other words, they are experts in their own experience, and this expertise is used for research, teaching or clinical management. Indeed, if we look at the growing number of recommendations in the literature (Cleemput, 2019; WHO, 2013; Pétré, 2018), we can see that they are moving in the direction of greater recognition of patients' expertise, at various decision-making levels. This recognition aims to respond to the many challenges facing healthcare systems. The evolution of the care paradigm shows that from the «paternalistic model», in which the role of the doctor was central, long recognised as the dominant model, the working philosophy has evolved towards a «patient-centred approach». In this approach, each professional takes account of the patient's opinion and preferences. The patient is thus at the centre of their concerns. Today, this evolution is leading to a «care partnership» (Deschênes et al., 2013). This model calls for a move away from a patient-centred approach, with full recognition of the expertise involved in living with a chronic illness. This recognition places the patient as an expert in the same way as other professionals.

One of the key ingredients of partnership in care is, of course, shared decision-making, and this ingredient draws heavily on the empathic communication we mentioned earlier. One conceptual model, the «three talks model», defines shared decision-making as an approach in which clinicians and patients share the available evidence when faced with the task of making a decision, and in which patients are supported in considering different options in order to reach an informed preference (Elwyn et al., 2010). This model highlights the importance of communication focusing on three important points: choice, options and decision (Elwyn et al., 2012). The first, the discussion of choice, aims to highlight the existence of choice. The second point, the discussion of options, focuses more specifically on the detailed description of the different options with verification of the patient's understanding of these options and their personal consequences. Finally, the third point deals with the decision itself, and aims to support the patient in this process. In this model, the main emphasis is therefore on providing information to the patient, with a parallel focus on exploring the patient's values, life context and needs (Goosse, 2023).

Today, the patient partnership is not limited to collaboration in care. In fact, it involves different missions (Flora, 2015). For example, the resource patient, who can support another patient in his or her care. They may also be asked to give their opinion on care procedures, for example, when participating in hospital ethics committees. Another example is the patient trainer, who is involved in teaching. This involvement can take place at various levels, from the development of clinical vignettes to the co-construction, co-teaching and co-assessment of the training programme (Towle et al., 2010). Finally, Flora (2015) also talks about the patient as co-researcher, i.e. a patient involved in research, an area in which the patient can intervene at different levels: from providing information about the research to being involved in its design and implementation.

These different degrees of involvement are described in the «continuum of patient engagement» present in the Montreal model (Pomey, 2015). When patient researchers work as a team with other professionals, we can say that they collaborate in an interdisciplinary way. This collaboration can increase the quality of the research.

As we shall see, the aim of this project is to increase partnership in care through appropriate paediatric communication, and is part of a patient-researcher and patient-educator approach.

Project objectives

The aim of the project is to set up an e-learning system to provide initial familiarisation with the skills needed for good communication in a patient-partner approach, in the paediatric context. The programme is aimed at 3 student populations: psychology, nursing and medicine. Various stages have been involved in setting up this project.

Firstly, in line with recommendations in the literature highlighting the importance of defining target competencies specific to paediatrics (Kaye et al., 2020) and in order to remain aligned with the objectives of the patient partnership, a competency framework was constructed using the Delphi round where the experts interviewed were also children.

Secondly, the teaching material was designed to make the system more attractive to learners, using an interactive platform to enable flexible progress in learning the skills. Next, the videos illustrating the targeted skills were created using a 360° camera, giving students a 360° view of the environment and making it easier for them to gain a patient's perspective.

Finally, in line with the new recommendations (HAS, 2020), the entire platform has been built by an interdisciplinary team that includes not only healthcare professionals but also patient partners, both in terms of research and teaching.

The following methodology describes the various stages in the construction of this platform to ensure reproducibility.

Project methodology

Building a communication framework specific to the paediatric context: The Delphi method ⁹

To build our repository of paediatric communication skills, we opted for the Delphi method, which enables a consensus to be reached among a group of experts (Dalkey & Helmer, 1962). This methodology combines an interprofessional approach with a patient-research partnership paradigm. As a reminder, the Montreal model (Pomey, 2015) states that healthcare professionals are the experts on the disease, while patients are considered to be the experts on 'living with' the disease, in other words the experts on lived experience. This vision, although not specific to paediatrics, highlights the wealth of experiential knowledge of patients and their families, who play an essential role in the co-construction of communication competence, with unique specificities and challenges.

If we transpose this paradigm to paediatrics, it means involving both children and family carers, to better understand their expectations in terms of communication with healthcare professionals. Applying this model involves several elements:

- As patients, children are direct interlocutors, but their communication needs change according to their age, their psychological and cognitive development, and their understanding of the disease.
- Parents, as the main interlocutors, provide a unique perspective on communication strategies that make daily life easier and reduce care anxiety.

In this context, the material for the Delphi round had to meet the challenge of integrating these multiple perspectives by adapting the language and questions to be understandable and relevant to all participants, whether health professionals, parents or children. To ensure that the language was appropriate, pre-tests were carried out with two children aged 11 and 13. Following these pre-tests, the items posing difficulties were rewritten.

Recruiting participants and adapting media

Recruiting participants for a Delphi round involving such diverse groups represents a methodological challenge. The main recruitment objective was to obtain a representative, inter-professional panel. In fact, one of the aims was to put together a panel balanced between the different healthcare professionals targeted by the educational system (doctors, nurses, psychologists) in order to capture the diversity of perspectives and avoid a bias linked to a single discipline. It was also essential to involve children and parents in this interprofessional team. This required a specific strategy to ensure that participants felt comfortable and represented.

In terms of administration, communication with the children was simplified and made fun to facilitate their involvement, while communication with the parents emphasised their essential expertise in the day-to-day management of their child's illness. Particular attention was paid to the composition of the groups in order to guarantee the independence of the responses. The parents and children taking part in the study did not come from the same family. The aim of this methodological precaution was to minimise the risk of parents influencing children's responses, allowing everyone to express themselves freely according to their personal experience

and individual perception of paediatric communication.

In total, two Delphi rounds were necessary. In order to reach a consensus, the discussions were structured to encourage complementary points of view, emphasising that communication skills are enriched by cross-fertilisation, and the presence of patient experts on the panel helped to reinforce the objective of these guidelines: to improve communication in order to meet the needs of young patients and their families, in line with the patient partnership paradigm.

The Delphi round, carried out within this inter-professional and partnership framework, made it possible to co-construct a skills reference framework that incorporates the specific nature of paediatric communication, while respecting the knowledge of each of the players involved. The Delphi method, enriched by the patient partnership model, has fostered collaboration between experts in the disease and experts in the experience, while overcoming the ethical and recruitment challenges inherent in this innovative approach to teaching and research. The full guidelines are available at: https://immersion360.eu/platform/fr/.

Building the simulation

The concept of the patient partner in the training of healthcare learners is traditionally based on the active involvement of real patients in the training process of healthcare professionals. Unlike simulated or standardised patients, who play a fictitious role during simulation, patient partners are real people sharing their real experience of illness, the hospital and the care they receive. In line with this patient partnership, in this project the collaboration with patient partners was carried out from the design stage right through to the simulation itself. The aspects of this collaboration were organised as follows.

The collaboration was carried out with a minor patient-expert (13 years old) who was an expert in her experience of growing up with the disease, accompanied by her mother. This double choice was based on the educational objective targeted in the scenarios, i.e. improving communication in paediatrics. The involvement of this expert patient and her carer was organised in different stages, which we will discuss below.

Building the script¹⁰

In concrete terms, the patient-partner and her mother began by sharing their experiences of the illness, their history, their experiences of care and the difficulties they had encountered in their relationship with professionals. This last point was explored in particular, as it was linked to the educational objectives of the scenario, and elements such as the attitudes, expressions and helpful or difficult techniques used by the professionals during moments of communication were explored.

Following these various discussions, clinical vignettes (a scenario with a nurse, a psychologist and a doctor) were drawn up, based on (1) their experiences and (2) the educational objectives targeted in the project.

The teaching objectives were defined according to the skills framework developed via the Delphi round. The scenarios were written in the form of dialogues illustrating the elements of communicative competence identified in the reference framework. In the dialogues, these skills were illustrated either adequately or inadequately, in order to prompt the students' reflections. Subsequently, the debriefings (see below) aimed to clarify which elements of the communication were inadequate or missing.

Once the scenarios had been drafted, they were submitted to the expert patient so that she could complete the missing elements to illustrate the skills targeted by the educational objectives. The aim was to create a balance between the representativeness of the scenarios in relation to her experience and the targeted educational objectives.

It should be noted that the close carer was also present at the various meetings. Her experiences and needs in terms of support for her daughter were therefore taken into account in the construction of the scenarios.

Video of the simulation session ¹¹

In this project, we opted for 360° immersion, which avoids the costly programming of an interactive virtual environment. However, there are a number of limitations to the use of 360° immersion. These include, of course, the technology and its cost. However, 360° cameras are becoming more widely available, and will be less and less of an obstacle for institutions or simulation centres. The realism of interactions is less than in VR. Indeed, even though the immersive environment allows for a high degree of realism because it involves video, no direct interaction with patients or the simulated clinician is possible due to technological limitations. Learners can observe authentic reactions, but cannot interact to influence the course of the scenario, which can limit the learning experience in terms of practising clinical interaction skills. Another limitation is the cyber-malaise. Some participants may feel a certain discomfort, which could hinder their immersive experience. A period of adaptation may be necessary before users feel comfortable in the virtual environment.

It is also crucial to adapt the simulation environment to the specificities of paediatrics, whether in terms of the medical equipment or the layout of the spaces, in order to guarantee an immersive and realistic experience for the learners.

In this project, the 360° camera was strategically positioned between the patient and the simulated clinician in order to allow a change of viewpoint (and to allow the clinician or the patient to be examined). In concrete terms, the scenario took place in a hospital room with the patient on her bed and her mum sitting next to her. A clinician entered the room and the camera was positioned halfway between the patient and the clinician.

Debriefing¹²

As part of the project and following the recommendations in the literature (Kaye et al., 2020), one of the elements in the construction of the platform was to allow students to self-reflect and debrief on the scenario observed.

To this end, each member team produced a debriefing vignette targeting one of the skills in the competency framework.

¹¹ Contributors: Laurence Peeter, Sylvie Lovulo ¹² Contributors: Luigi Flora

The creation of debriefing scenarios targeted the observable manifestations of each ability. The different scenarios were analysed on the basis of each ability, highlighting the elements that were correctly implemented in the video, those that were not present, proposing examples illustrating how these skills could have been mobilised, and finally targeting the skills that were mobilised inadequately or incompletely. The debriefings were based on good practice identified in the literature (Rudolph, 2007).

The aim of these debriefings, which are included on the platform in the form of a 5-10 minute video clip, is to enable students to identify and observe the way in which communication behaviours can be put in place, so as to create a reflection on the specific nature of paediatrics.

A few recommendations to guide the creation of an immersive experience ¹³

The insert below shows some of the guidelines for creating this type of simulation.¹⁴

Box 1: Creating a 360° simulation

For scenario development, several authors have proposed structures including different stages. For example, the latest version of the SoFraSims (Société Francophone en Simulation en santé) reference framework proposes scenario outlines for clinical immersion, particularly for simulations involving a simulated patient. These guidelines can be freely adapted to meet specific needs.

In this vein, here are a few educational ingredients and documents that can be associated with a 360° simulation:

Background to the scenario

This administrative form can include basic information, such as :

- The duration of the simulation session
- The staff involved (health professionals, teachers)
- The simulation environment (room, equipment)
- The patient's age group (e.g. a child aged 11 to 13 with a chronic illness, as in the Simucare-Immersion project)

Educational objectives sheet

These must be defined in direct relation to the skills to be acquired by learners, such as:

- Knowing how to communicate with a child with a chronic illness
- Recognising and learning to manage emotions in paediatric care

Building the script

The teaching objectives and the scenario must be directly linked to the personal history of the partner patient (for example, by being inspired by satisfactory or unsatisfactory medical encounters) and defined according to the needs of the learners, as recommended by simulation teacher-trainers. The participation of the patient partner should therefore start as soon as the scenarios in which they embody their own role are created, in order to provide a real-life experience. The inclusion of a simulated clinician in the scenario is also essential. This simulated clinician and the scripted situation should take on certain characteristics of real-life situations.

To co-construct the scenario with the patient partner, an interview is organised to gather key information about their experience of care (including emotions), interactions with carers and the behavioural aspects they have observed and experienced. These elements serve as a basis for developing a relevant and authentic scenario.

Choice of patient partner

The choice of paediatric patient partner is essential. They must be able to communicate effectively and play their own role during the simulation session.

Briefing of the partner patient and the simulated clinician before the simulation

The child, as a patient partner, and his or her close carer, must be briefed in an appropriate manner. The briefing must be adapted to the child's specific needs. It is essential to discuss the child's attitude, behaviour and reactions to ensure that the session runs smoothly. It may also be important to reiterate the attitudes of the simulated clinicians in the light of the partner patient's experience. Briefing the healthcare professionals is therefore also essential. They must interpret the emotions, attitudes, behaviours and words of the clinicians as described in the scenario co-constructed with the partner.

Film of the simulation session

It must be structured around trigger events that enable the target skill to be assessed, in this case communicative skills in paediatrics. In other words, specific situations or actions that provoke a reaction from the participants (the learners). These events are planned to assess the way in which participants communicate with paediatric patients (children) and their relatives. The 360° camera can be strategically positioned between the patient and the clinician in order to allow a change of point of view (and to allow looking at the clinician or looking at the patient).

Preparing the learner

The simulation must be accompanied by various materials for the learner, such as :

- Documents to be provided to the learner before the simulation (fictitious medical records, teaching sheets)
- Description of the simulation environment (e.g. paediatric hospital room)
- A **pre-briefing** to inform learners about the context and objectives of the scenario.

Script quality criteria

The ethical and good practice recommendations issued by the HAS (2023) emphasise respect for ethics and support for the patient-partner. It is essential to respect bioethical principles, in particular autonomy, beneficence, non-maleficence and distributive justice. It is imperative to ensure that the **pa-tient partner** feels comfortable throughout the simulation and that the educational objectives are achieved. Throughout the process, it is essential to respect the personal history of the **patient partner** as well as that of their close carer.

Evaluation of the plateform

Following the completion of the platform by participants from the various fields, a questionnaire was administered to assess participants' satisfaction with the e-learning platform and its use.

A questionnaire was also administered before and after the scheme in order to observe any improvement in knowledge in relation to the skills in the reference framework.

Results 15

Socio-demographic data

The following results first give the socio-demographic information of the participants and then describe their level of satisfaction with various variables. A total of 100 people used the platform, but only 53 participants completed the final questionnaire.

The following table shows the number of participants by country.

Country	Frequency	Percentage
Belgium	23	43.4
Portugal	21	39.6
Romania	7	13.2
Other	2	3.8
Total	53	100.0

Thus, 43.4% of the participants came from Belgium, 39.6% from Portugal, 13.2% from Romania and 3.8% from other countries. In addition, 81.1% (N = 43) were women and 18.9% were men (N = 10).

In terms of training pathways, the majority were nursing students.

Training	Frequency	Percentage
Nursing care	38	68
Psychology	6	11
Medicine	3	55
Other	9	16
Total	53	100.0

Of these participants, 79.3% (N = 42) had never done a paediatric placement, 7.5% had done one placement (N = 4) and 13.2% had done several placements (N = 7).

In terms of previous experience of an e-learning platform, 39.% of participants had already been confronted with this type of learning before (N = 21), while 60.4% of participants (N = 32) had never done so before

When viewing the 360° video, only 17% of participants used virtual reality goggles (N = 9), compared with 83% who viewed it using a computer or smartphone (N = 44).

Satisfaction with use of the platform

With regard to the clarity of the platform's navigation, the responses to which are shown in the table below, the majority of respondents (90.6%) agreed or somewhat agreed that the instructions for navigating the platform were clear.

A minority (3.8%) disagreed with this statement and 3.8% were neutral. These results suggest that the majority of users perceive the navigation instructions to be clear, which may contribute to effective use of the platform.

The navigation instructions are clear	Frequency	Percentage
Total disagreement	2	3.8
Somewhat disagree	1	1.9
Neutral	2	3.8
Somewhat agree	17	32.1
I totally agree	31	58.5
Total	53	100.0

As for the ease of navigation within the platform, here again, a majority of participants at least 'tend to agree' with this ease of use (88.7%). The interface therefore seems intuitive and easy to use.

Easy, intuitive navigation	Frequency	Percentage
Total disagreement	0	0
Somewhat disagree	4	7.5
Neutral	2	3.8
Somewhat agree	18	34.0
I totally agree	29	54.7
Total	53	100.0

Users were then asked whether they felt the platform could be a plus in their training. The table shows that the majority of respondents (83.1%) felt that the platform was a plus in their training programme. A proportion of 15.1% expressed a neutral opinion, while a very small minority (1.9%) 'Rather disagree'. These results indicate that the majority of respondents see the platform as an interesting addition to their training programme.

The platform is a plus	Frequency	Percentage
Total disagreement	0	0
Somewhat disagree	1	1.9
Neutral	8	15.1
Somewhat agree	18	34.0
I totally agree	26	49.1
Total	53	100.0

Despite the diversity of courses, the table below shows that the majority of respondents (88.7%, i.e. 45.3% «Somewhat agree» and 43.4% «Strongly agree») consider that the content provided by the platform is adapted to their level of knowledge or training. A moderate proportion (11.3%) expressed a neutral opinion, and no participant disagreed. These results suggest that the content as a whole is aligned with users' level of learning.

The table below shows that the majority of respondents (88.7%) consider that the content provided by the platform is adapted to their level of knowledge or training, despite the diversity of profiles. A moderate proportion (11.3%) expressed a neutral opinion, and no participant disagreed. These results suggest that the content is widely perceived as being aligned with users' level of learning, thus facilitating their learning.

The content is adapted to my level	Frequency	Percentage
Total disagreement	0	0
Total disagreement	0	0
Neutral	6	11.3
Somewhat agree	24	45.3
l totally agree	23	43.4
Total	53	100.0

The table below shows that the vast majority of respondents (94.3%) felt that the content provided by the learning platform was sufficiently comprehensive. A minority (5.7%) expressed a neutral opinion, and no participant reported any disagreement on this subject. The content of the platform therefore seems to be widely perceived as being sufficiently complete.

The content is comprehensive enough	Frequency	Percentage
Total disagreement	0	0
Somewhat disagree	0	0
Neutral	3	5.7
Somewhat agree	28	52.8
I totally agree	22	41.5
Total	53	100.0

A minority of participants had completed a work placement (21%) but felt that the learning platform met a need felt during a work placement or simulation session. A significant proportion (35.8%) expressed a neutral opinion, while a minority (5.7%) felt that the content did not meet their needs. These results suggest that, although the content is generally perceived as

useful, a significant proportion of participants remain hesitant or undecided on the subject.

Content meets a need	Frequency	Percentage
Total disagreement	2	3.8
Somewhat disagree	1	1.9
Neutral	19	35.8
Somewhat agree	21	39.6
l totally agree	10	18.9
Total	53	100.0

Next, with regard to the transferability of learning in practice, as shown in the table below, the majority of respondents (81.1%) felt that their learning was easily transferable during simulation and/or placement activities. 18.9% expressed a neutral opinion, and no respondent disagreed. These results indicate that the learning acquired is widely perceived as applicable and relevant to practical situations.

My learning is easily transfe- rable to practice	Frequency	Percentage
Total disagreement	0	0
Somewhat disagree	0	0
Neutral	10	18.9
Somewhat agree	27	50.9
I totally agree	16	30.2
Total	53	100.0

With regard to independent use of the platform, the table below shows that the majority of students (90.6%) felt that free and independent use of the platform facilitated their learning process. A minority of participants (3.8%) disagreed, and 5.7% expressed a neutral opinion. These results indicate that the autonomy and flexibility offered by the platform are widely appreciated and perceived as an asset for learning.

Using the platform inde- pendently made it easier for me to learn.	Frequency	Percentage
Total disagreement	0	0
Somewhat disagree	2	3.8
Neutral	3	5.7
Somewhat agree	24	45.3
I totally agree	24	45.3
Total	53	100.0

With regard to the more specific usefulness of the competency framework, the vast majority of respondents (90.6%) considered the framework to be useful for learning communication in paediatrics. Only 1.9% of participants disagreed and 7.5% adopted a neutral position. These results suggest that the repository is widely perceived as a relevant tool for supporting the learning of this skill.

The reference system is useful	Frequency	Percentage
Total disagreement	0	0
Somewhat disagree	1	1.9
Neutral	4	7.5
Somewhat agree	23	43.4
I totally agree	25	47.2
Total	53	100.0

With regard to the usefulness of pre-post as a learning support, the majority of students (75.5%) consider that it could provide support. A proportion of 20.8% expressed a neutral opinion, while 3.8% 'Rather disagree'.

Pre- and post-test modality is a plus	Frequency	Percentage
Total disagreement	0	0
Somewhat disagree	2	3.8
Neutral	11	20.8
Somewhat agree	18	34.0
I totally agree	22	41.5
Total	53	100.0

With regard to the time required to complete the pre-test, a relative majority of participants (73.5%) felt that the time allowed to complete both the pre-test and the post-test was reasonable. A minority of participants (5.7%) disagreed, while 20.8% expressed a neutral opinion.

The time allowed is reaso- nable	Frequency	Percentage
Complete disagreement	0	0
Somewhat disagree	3	5.7
Neutral	11	20.8
Somewhat agree	20	37.7
I totally agree	19	35.8
Total	53	100.0

The vast majority of respondents (94.3%) agreed that the proposed immersive video was suitable for promoting learning. A very small minority (1.9%) disagreed, and 3.8% adopted a neutral position. These results show that immersive video is perceived as a relevant tool for teaching this skill.

The immersive video viewed is suitable for learning commu- nication skills	Frequency	Percentage
Complete disagreement	0	0
Somewhat disagree	1	1.9
Neutral	2	3.8
Somewhat agree	29	54.7
l totally agree	21	39.6
Total	53	100.0

With regard to the propensity of immersive video to generate emotions, the table below illustrates that the majority of respondents (58.5%) believe that the immersive video viewed generates emotions. However, a significant proportion of participants (26.4%) expressed a neutral opinion, while 15.1% «Rather disagree». These results suggest that, although the immersive video generated emotions for a majority of participants , this was not the case for a significant proportion of respondents

Immersive video viewing lets you feel the emotions	Frequency	Percentage
Complete disagreement	0	0
Somewhat disagree	8	15.1
Neutral	14	26.4
Somewhat agree	24	45.3
I totally agree	7	13.2
Total	53	100.0

The table shows that the majority of respondents (83%») consider that the immersive video viewed is an asset for learning communication skills. Only 17% of participants had a neutral opinion, and none disagreed. These results show that immersive video is very positively perceived as a teaching tool for developing these skills.

Immersive video is a plus	Frequency	Percentage
Complete disagreement	0	0
Somewhat disagree	0	0
Neutral	9	17.0
Somewhat agree	22	41.5
I totally agree	22	41.5
Total	53	100.0

The table below shows that the majority of respondents (83%) consider the time required for e-learning to be manageable. A minority of participants (1.9%) disagreed, while 15.1% were neutral.

Time is manageable	Frequency	Percentage
Complete disagreement	0	0
Somewhat disagree	1	1.9
Neutral	8	15.1
Somewhat agree	25	47.2
I totally agree	19	35.8
Total	53	100.0

Impact of the platform on participants' knowledge ¹⁶

The evaluations reported below were carried out on only part of the sample, depending on the validity of the data concerned. The sample consisted of 8 psychology students, 54 nursing students and 2 medical students. The impact of the training on participants' knowledge of paediatric communication was analysed by competency using repeated measures ANOVA. When an effect of the training was observed, post-hoc analyses evaluating the impact in the different student groups (nursing, medicine, psychology) were carried out.

Skill 1	PRE - M (ET)	POST - M (ET)
Student doctors (N =2)	8.5 (12)	50 (24)
Psychology students (N = 8)	10.5 (12.4)	45.9 (27.8)
Nursing students (N = 54)	39.8 (22.8)	44.8 (26.3)

Skill 1 - Making

Notes. *M* = *Mean*; *SD* = *standard deviation*.

Regarding students' knowledge of this first skill, we can observe an effect of e-learning (F = 9.46; p = .003) as well as an interaction between the groups (F = 4.21; p = .009). Post-hoc analyses revealed a significant improvement in the psychology student group only (t = -3.46; p = 0.019). The lack of effect observed in the doctors was due to the small number of participants. The lack of effect for the nursing group could be due to good performance at the initial assessment before training.

Skill 2 - «Establishing a relationship of trust

Skill 2	PRE - M (ET)	POST - M (ET)
Student doctors (N =2)	33.5 (47.4)	75 (11.3)
Psychology students (N = 8)	31.3 (20.8)	50 (28.1)
Nursing students (N = 54)	62 (23.9)	66.4 (25.2)

Notes. M = *Mean; SD* = *standard deviation.*

In terms of students' knowledge of the skill of «establishing a relationship of trust», a significant improvement was observed (F = 9.66; p = .003) with no effect on the group (F = 1.66; p = .183), meaning that this improvement was statistically similar across all groups of students.

Skill 3	PRE - M (ET)	POST - M (ET)
Student doctors (N =2)	66.5 (23.3)	50 (24.0)
Psychology students (N = 8)	29.3 (29.3)	39.5 (33.3)
Nursing students (N = 54)	33.4 (30.3)	35.5 (33.6)

Skill 3 - Building shared understanding

Notes. M = Mean; SD = standard deviation.

No significant change was observed in students' knowledge of the «Building shared understanding» competency (F = 7.9e-4; p = 0.979).

Competency 4 - Making a shared decision

Skill 4	PRE - M (ET)	POST - M (ET)
Student doctors (N =2)	50 (70.7)	100 (0)
Psychology students (N = 8)	45.8 (44.3)	81.4 (30)
Nursing students (N = 54)	85.2 (22.8)	88.3 (20.3)

Notes. *M* = *Mean*; *SD* = *standard deviation*.

With regard to students' knowledge of skill 4, we can observe an effect of e-learning (F =21.72; p<.001) as well as an interaction between the groups (F = 5.75; p =.001). While improvements were noted in all three groups, post-hoc analyses revealed a significant improvement in the psychology student group only (t = -3.966; p = 0.004). The lack of effect observed in the doctors is linked to the small number of participants. The lack of effect for the nursing group could be due to good performance from the initial assessment before training.

Skill 5 - Informing the end of the match

There was no significant change in the students' knowledge of the skill 'Informing about the end of the meeting' (F = 2.36; p = 0.129).

Skill 5	PRE - M (ET)	POST - M (ET)
Student doctors (N =2)	66.5 (23.3)	83 (0)
Psychology students (N = 8)	39.6 (17.7)	45.8 (36.5)
Nursing students (N = 54)	47.9 (18.4)	51.6 (25.7)

Notes. *M* = *Mean*; *SD* = *standard deviation*.

Discussion

The aim of the following discussion is to suggest various avenues for reflection and improvement, so that future research projects can reproduce or extend the working methods implemented during this project. It is organised into four main points. The first two deal with points relating to the project's methodology: the use of the Delphi round and the inclusion of the patient partner; and the last two deal with the results: firstly, participants' satisfaction with the platform, and secondly, the platform's effectiveness in learning the communicative skills targeted in the competency framework.

The Delphi Round 17

Ethical Issues of the Delphi Round

Involving children and families in collaborative research raises specific ethical issues, which have been carefully considered:

- **Respect for the patient's voice**: Children and parents must be able to freely share their experiences and expectations without feeling judged or influenced by the presence of health-care professionals. The methodological framework of the Delphi round has been adapted to guarantee a safe space for discussion that respects these differences in experience.
- **Informed consent and adaptation of information materials**: Each group taking part in the Delphi round (professionals, parents, children) received a personalised information letter. The letter for the children, for example, used simple, illustrative language to help them understand their role in the research and invite them to share their feelings. For parents, particular attention has been paid to the importance of their expertise in «living with», and for professionals, the letter explains their support role in improving communication in paediatrics.

Limitations of the Delphi Method and Methodological complements

Although the Delphi method is invaluable for achieving consensus, it has certain limitations in the paediatric and interprofessional context. The following limitations were encountered and different perspectives identified

The first limitation is the complexity of expectations and the nuances of paediatric communication. A Delphi round based on a written reference framework does not always capture all the subtleties of interactions, especially in situations where non-verbal communication or children's signals of discomfort are important. It might therefore be useful to supplement the Delphi round with methodological tools such as qualitative interviews to gain a deeper understanding of the children's feedback and any hesitation they may have in expressing criticism or points of disagreement.

The second limitation concerns the choice of age range for the children. The decision to include children between the ages of 11 and 13 was based on their ability to understand and formulate thoughtful responses about their experience of communicating with healthcare professionals. This age group is often considered to be a pivotal age, in which children begin to autonomously express their needs and expectations, as well as being able to verbalise their experiences. However, there are limits to this choice, as communication needs vary considerably at different

ages. The communication skills necessary for younger children (under 11), for example, or for older adolescents (over 13) may not have been fully captured in this study, despite the vigilance of health professional experts. To overcome this difficulty, other methodological tools could be used in addition, such as age-appropriate focus groups, particularly for younger children, using playful discussion groups incorporating interactive activities such as drawings, role-playing or role-playing situations. For younger children, whose verbal skills are still limited, direct observation during real or simulated interactions with healthcare professionals can provide valuable information. Analysis of non-verbal behaviour (facial expressions, gestures) could identify key indicators of comfort or discomfort in communication.

The patient partnership ¹⁸

The involvement of the patient-partner was developed at various levels as part of this educational research project.

The aim was for the involvement of a patient researcher to enable reflection and to «build together» (D.C.P.P., 2014) a learning platform that would enable students to position themselves in a «partnership in care».

In concrete terms, we collaborated with an adult patient researcher, who participates in many research projects and who gave us a patient's point of view on the choices we were making and the directions the research work was taking. Next, we built the competency framework by including child patients and parents in the Delphi round. Finally, we used a paediatric patient and her close carer to develop the scenarios and film them.

This partnership work in the research was made possible by the adoption, by all the parties involved, of a partnership posture. According to Deschênes et al (2013), this partnership takes the form of a cooperative/collaborative relationship between the patient and those involved. It is part of a dynamic process of interaction and learning. This partnership is based on recognition of the knowledge of all parties (Deschênes et al., 2014).

The learning platform

Satisfaction with use of the platform ¹⁹

The platform for teaching and learning communication in a paediatric context was evaluated by nursing, medical and psychology students in terms of its ergonomics and ease of use. More specifically, student satisfaction was assessed on a number of dimensions: its ergonomics, visual appeal, ease of navigation, educational content and the material used (360° videos). The opinions expressed mainly reflect those of female nursing students with no experience of paediatric clinical teaching and no previous experience of using teaching-learning platforms.

The platform was identified by students as an asset for learning communication skills in a paediatric context. The general perception is that it is easy and intuitive, with clear instructions, allowing students to use and learn independently and flexibly. The teaching content is considered to be appropriate to the students' level of training and comprehensive, which is not unrelated to the participation of carers and children in the construction of teaching material, a participation that is increasingly valued in this field (Kohlsdorf & Junior, 2016). More data needs

to be collected before similar results can be concluded for medical and psychology students due to the smaller number of respondents in these categories.

Although the results are very positive overall in terms of satisfaction, there are some aspects that need attention for future improvements to the platform. One of these concerns the visibility of emotions in the videos. The use of the computer and/or smartphone as a method of viewing immersive video could have limited this visibility. Possible improvements could involve the use of cardboards or virtual reality headsets, or the design of scenarios that focus more intentionally on behavioural indicators of emotions.

Let's now turn to the needs encountered during placements or simulations and the contribution of the platform in this respect. The results reflect a heterogeneity in students' expectations. In fact, most of them have no experience of clinical teaching or placements in paediatric settings, so the partial adequacy of the content in relation to the skills required could in fact reflect idealised practice on the part of the student. At the same time, it is true that certain adaptations could be made to the competency framework (see above) in order to bring it closer to the expectations of learners. More precisely, this reference framework could subsequently be adapted to the different age groups in order to work on different behaviours adapted to the different stages of a child's development.

On the other hand, the time required to complete the pre- and post-tests gave rise to significant reservations on the part of some students, who felt that the tests could be shorter. In this regard, it should be noted that the students had around 60 minutes to explore the platform, with a significant number of students not completing the task. It would be appropriate to allow more time for the completion of learning activities on the platform in future studies. We recognise that time management by students when exploring the platform was not an easy task due to the amount of content, lengthy tests or other reasons, which a qualitative study with these students could help to clarify as a first step towards an improved proposal for the platform with a better balance of time required for its use and evaluation.

Several studies have shown that the use of simulation and debriefing in the teaching of communication skills increases students' learning success (Blake & Blake, 2019; Bremner et al., 2006; Donovan & Mullen, 2019; Gaylle, 2019; Levy-Storms, 2008). Simulated teaching using immersive tools (360° videos), in e-learning format, offers new advantages. The autonomy and flexibility that the platform offers students seem to be highly appreciated, and could contribute to solid and appropriate learning conditions.

Effect of the platform on skills knowledge ²⁰

As regards the effectiveness of the e-learning platform in improving the knowledge of these users in terms of paediatric-related communicative skills, we obtained heterogeneous results depending on the abilities concerned and the curricula of the targeted students.

There was an improvement in ability 1, which focused on the ability to make contact with the child, ability 2, which focused more specifically on the ability to establish a relationship of trust, and ability 4, which focused on the construction of a shared decision.

Only ability 2 (establishing a relationship of trust) improved significantly for all participants, regardless of their course of study. Abilities 1 (making contact with the child) and 4 (making a shared decision) were only significantly improved by psychology students.

Various hypotheses may explain these results. On the one hand, students in psychology were accompanied when they took the platform, whereas students in nursing and medicine took it on their own. One hypothesis could therefore be that the abilities were not developed in depth when they were developed independently. Another very likely hypothesis, in view of the results obtained by the nursing students during the pre-tests, in abilities 1 and 4, concerns the possible room for improvement. Nursing students obtained much higher results in the pretest for these two abilities than psychology students. Thus, the room for improvement was limited for nursing students. This is because the psychology students were at the beginning of their course, whereas the nursing students were at the end of their course. If the current results were to be reproduced in a similarly supervised experiment in all the groups, this could suggest a greater relevance of the platform for students at the beginning of their cycles. This hypothesis would be congruent with the literature targeting the learning of soft skills such as communication (Miller et al., 1990; Kirkpatrick et al., 1989), which postulates that these skills are learned in stages. Firstly theoretical learning, then learning of the skill in a non-real context (mobilisation of the skill in writing for example) and finally learning of the mobilisation of the skill in a situation (Miller et al., 1990). As the e-learning platform developed in this project targets the first two stages of learning, it is potentially more appropriate at the start of the course.

The homogeneous improvement observed in the second ability could be explained by greater interest in this ability and therefore more specific attention paid by the students to learning it. A more qualitative evaluation would enable us to confirm or refute this hypothesis. Generally speaking, the three skills in which an improvement was observed were those for which the debriefings were the most targeted, both in terms of duration and skills targeted. Given the advent of social networks offering increasingly short videos with targeted messages, this type of format in an e-learning context could be more suitable for students of this generation, a hypothesis which seems consistent with the knowledge available on attentional capacities (Harris et al., 2021).

In order to confirm these results, further studies would be needed to compare the effectiveness of the platform with students from different cycles, so as to target the audience for whom the platform would be most relevant. Furthermore, at the very least, if the platform is to be evaluated, and more generally if the courses are not to be evaluated, it would seem important to supervise the implementation of e-learning, to ensure that students actually complete the entire course.

In addition, whatever the capacity concerned, there were too few medical students to conclude on the effectiveness of the platform, so further studies are needed to draw conclusions.

Conclusion

Overall, the platform is perceived as ergonomic and pedagogically useful for teaching and learning communication skills in paediatric healthcare. Its strengths lie in its clarity, breadth and relevance to students' learning needs, as well as in the flexibility and autonomy it offers its users. Areas for improvement include the suitability of the immersive videos for evoking emotions and meeting students' specific expectations, and a more accurate assessment of the time needed to benefit fully from the learning offered by the platform. These results show that the platform is an innovative and promising tool which, with a few adjustments, helps to meet students' needs

In conclusion, the specificities of the paediatric context in the learning of communication among healthcare professionals are not sufficiently taken into account in curricula (Kennedy et al., 2024; Padovani et al., 2024). This platform aims to fill this gap by offering a learning platform targeting these skills, aimed at students and healthcare professionals. It should be emphasised that this is an open-access platform, which can be used independently by students, integrated into traditional teaching or used in a hybrid way. Thus, its dissemination could support academic programmes relating to these skills. As the negative impact of insufficient teaching of communication skills on the quality of care has been widely documented (Fallah et al., 2024; Mack et al., 2017), this platform could offer an initial, basic solution in support of other teaching approaches.



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