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Motivation of student radiographers in learning situations based on role-play simulation: A multicentric approach involving trainers and students

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ABSTRACT

Introduction: Role-play simulation is implemented in different radiography institutions. This tool develops Knowledge, Skills and Competences (KSC) in students. The aim of this study was to identify the strategies implemented by trainers in order to encourage student motivational dynamics and to find those that resonate with students.
Methods: Three role-play simulation sessions using a grid were observed in two different radiography institutions that have a simulation centre (two French institutions and one Swiss). In order to identify explicitly or implicitly the motivational strategies used, four interviews with trainers were conducted. To understand students' opinions about these strategies, seven interviews with radiography students were done.
Results: Defining motivation was not easy. The trainers used various strategies to motivate students, not all of which were verbalized in interviews. Although students said they were stressed prior to participating in role-play simulation, this study shows that such simulation sessions are effective to develop high motivational dynamics for students.
Conclusion: This study has identified three main areas of improvement: exploring students' expectations, give importance to patients briefing so that they can fully perform their role and improving the authenticity of the environment. The latter issue can only be addressed through access to up-to-date equipment in training institutions.

Introduction

In France, since 2012, the radiographer educational program[1,2] has offered a multidisciplinary (diagnostic radiography, radiotherapy and nuclear medicine) bachelor's degree corresponding to 180 ECTS (European Credits Transfer and Accumulation System). About 1000 radiographers graduate every year. Since 2012, French training institutions have followed the European recommendations that the learning outcomes to be achieved by the students should be defined in terms of Knowledge, Skills and Competences (KSC) and that the academic level achieved be classified according to the level at which KSC are developed.[3,4]

In this context, new national educational guidelines were introduced which encourage training institutions to use and promote simulation as a teaching tool particularly in professional and practical teaching units.[5]

Simulation is an active-teaching method involving active participation of students in their learning.[6] It is well known that

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this tool boosts the intrinsic motivation of students and promotes in-depth learning to make KSC development easier.[6] Assimilating and integrating theories of motivation is a prerequisite for trainers aiming to apply such a tool in their teaching department.[7]

Two main objectives guided this work based on role-play simulation:

- identify the strategies (conscious or unconscious) implemented by the trainers in order to promote the motivational dynamics of the students and
- find the ones that resonate with students.

It is important to define the various concepts of motivation and to explain the notion of role-play simulation.

Theoretical framework

Motivation

According to the French dictionary,[8] motivation is *"what motivates, explains, justifies an action; the causes, reasons, interests or elements that push someone into action; that motivate someone to act"*.

Motivation is a recent research topic in the field of health sciences.[9] Several theories of motivation have emerged over the past 50 years (Ames, DeCharms, Bandura, Pintrich, Weiner, Dweck, Nuttin, Vallerand …)[10,11]; but the two main theories were developed by Deci and Ryan on the one hand, and Viau on the other hand.

Deci and Ryan's theory[12]

Deci and Ryan developed the theory of self-determination (SDT) which is based on the concept that three basic needs explain our choices and condition our motivation:[12]

- the need for autonomy,
- the need for competence,
- the need for social belonging.

Authors classify motivation into three subgroups according to the different reasons or goals that give rise to an action:[13]

- **Amotivation**: the absence of any form of motivation. In this case, the student is enrolled in a curriculum without understanding its reasons or its interests.[14]
- **Extrinsic motivation**: individuals are forced to act under the constraints of external forces, "refers to doing something because it leads to a separable outcome",[13] under the weight of a social demand, to avoid sanctions (obligation to obtain a diploma, obligation to follow a learning sequence …)
- **Intrinsic motivation**: individuals act under the influence of internal forces, *"refers to doing something because it is inherently interesting or enjoyable"*,[13] a personal satisfaction in the performance of a task.

Motivation is constantly evolving, changing depending on many factors.[6]

The more motivation tends toward intrinsic motivation, the higher the level of self-determination will be (Fig. 1). When the latter is high, students develop effective learning strategies.[12]

Viau's model

In 2009, Viau published the motivational dynamics model (Fig. 2).[15] This author defines motivation as a dynamic state, in constant variation, which is rooted in the perceptions and

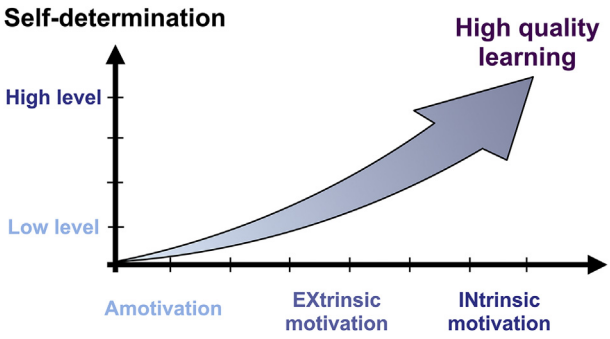

Figure 1. Self-determination theory.[12]

environment of the student and which leads the student to choose an activity, engage in it and persevere in its accomplishment to achieve a goal: learning. This motivational dynamic comprises three main levers:

- **perception of task value**: interest and usefulness of a task. The term "interest" refers to intrinsic pleasure and the term "utility" to the benefits of an activity.
- **perception of competence**: judging the ability to succeed in what is required.
- **perception of controllability**: the degree of control that students believe they exercise during an activity.

These sources of motivational dynamics generate manifestations of the student's learning behaviour:

- **cognitive engagement**: refers to the student's attention and concentration,
- **perseverance**: when the students spend the time necessary on activities in order to succeed, a precursor of success,
- **learning/performance**: final manifestation resulting from motivational dynamics.

Role-play simulation

Simulation is one of the teaching methods that actively involves students in learning tasks.[16] It could be defined as follows: *"The term health simulation refers to the use of a material (such as a dummy or a procedure simulator), virtual reality, or a standardized patient to replicate care situations or environments, in order to teach diagnostic and therapeutic procedures and to repeat (para)medical processes, concepts, or (para)medical decisions of a health professional*

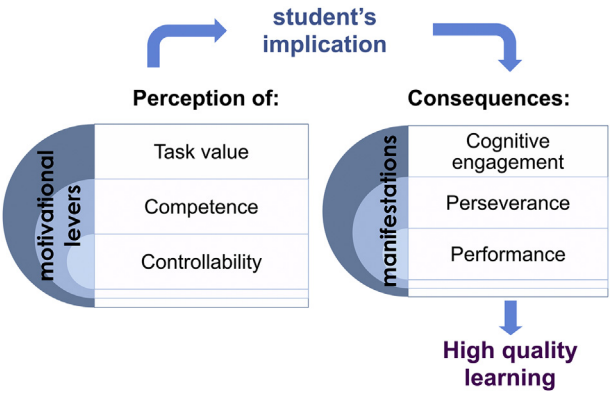

Figure 2. Viau's model.[15]

or a team of health professionals".[17] This tool enables the acquisition of KSC with the ultimate goal of improving patient care.

Our study focuses on role-play simulation. This educational tool requires:[18]

- scenarios to achieve specific objectives,
- a clinical environment as realistic as possible,
- multimedia equipment (camera, microphones, screens).

A role-play sequence is usually divided into three major parts:[19]

- Players and observers briefing
- play/observe,
- debriefing between players and observers.

Debriefing is the central step of the simulation process.[20] The objective of debriefing is to encourage exchanges and reflection between students (players and observers) in order to understand the processes that led to past actions.[21] During debriefing, learning takes place between students.[20] Structured role-play enables learners to reflect both "in" and "on" action.[20] Past action provokes reflection: *"Another advantage to be noted is the reflexivity work on practice that simulation allows, promoting the consolidation of clinical competences".*[22] It should be noted that competence can be defined as *"complex action skills based on the effective mobilization and use of a variety of resources".*[23] Debriefing integrates the necessary steps of contextualization, decontextualization and recontextualization.[24] These steps facilitate the transfer of learning[25] while being part of this competency-based approach.[26] Learning in a clinical setting is essential to developing and maintaining students' competences.[21]

Role-play simulation incorporates various elements to motivate the student as long as the trainer organizes this activity optimally so that the students have a high perception of the three motivational levers seen previously.[6] This study aims to identify the motivational strategies put in place by the trainer and to find those that echo with the students.

Methods

Interviews

Most of the papers published to date in this field have used quantitative methods to measure students' motivation.[9] We have chosen a qualitative approach in order to know opinions and feelings of both trainers and students.[27] Semi-structured, face-to-face, individual interviews were conducted. Since in any research ethical and deontological rules are to be respected and announced to the respondents, before collecting the data we explained the purpose of our survey by emphasizing the anonymity of the people in order to guarantee the results of our study.[28] No personal data were collected during the interviews. The same interviewer conducted all the interviews. This interviewer was a radiographer trainer with experience of conducting interviews. The interviewer had not met or contacted the students before. The interviewer contacted the institutions by telephone beforehand to obtain their agreement to conduct the research. After consultation within the institution, the agreement was given. The interviewer had not met the trainers interviewed before.

This study was conducted in two training institutions equipped with a simulation platform: one in France and one in Switzerland. The institutions had specific equipment for radiographers, recreating a realistic environment. They were equipped with a computed tomography and a magnetic resonance imaging area, a patient room and conventional X-ray apparatus. We chose to study role-play simulation in the field of conventional radiography. The simulations were about osteoarticular radiographic examinations, corresponding to the training program at the time of the interviews. Two volunteer students for the role-play were invited to take care of a patient together and perform the prescribed x-rays. Four interviews with trainers and seven interviews with students were conducted in the spring of 2017.

Trainers' interviews

To identify the motivation processes explicitly or implicitly used, one interview was conducted in Switzerland and three in France. This difference can be explained by the number of trainers present on the day of the survey. All the trainers had a radiographer's background. The average duration of an interview was 35 min.

An interview guide following different steps (preparation, simulation session and motivation) was developed and used. This guide included questions relating to the pedagogical approach used by the trainer. For example: "What are the different steps in the development of a simulation session?", "What elements or strategies do you think motivate students in the simulated practice?" Each interviewee was allowed to freely express himself/herself on each aspect of his/her choice.

Student radiographers' interviews

To understand the students' opinions on the various motivation strategies implemented by the trainers, three interviews were held in Switzerland and four in France. The students interviewed were in their second or third year of training. We deliberately excluded first-year students because in these two centres a procedural simulation is used in the first year and not a role-play simulation. We chose to interview only the student volunteers and who played during the simulation session of the study day in order to obtain their opinion as active participants. There were 10–20 observers, depending on the simulation session, who were not interviewed as part of this study. This explains the low panel of seven. The average duration was 30 min.

A second interview guide was used, inspired by the 10 conditions necessary for a learning activity (such as an exercise, an essay, classroom presentation) to motivate learners according to Rolland Viau.[29] Its purpose was to understand and perceive the student's experience during the simulation session. For example, the guide included the following questions: "How did you experience this simulation session?", "What are the different elements that motivate you in a simulation context or the elements that give meaning to what you do?".

All the statements were transcribed under the Word software (Microsoft® Word for Mac 2011, Version 14.1.0) and were analysed in two phases. A vertical analysis was first conducted for each interview transcript. The aim was to identify information of the same nature and classify it into different headings at the individual level. A cross-sectional analysis was then conducted in order to highlight recurring judgements and opinions throughout the interviews as well as discordant opinions.[30] The data analysis was done by the same person who collected the data: the interviewer.

Observations

In order to complete the data collected through our interviews, we chose to associate observations with them. It is recognized that the data collection tool used in the present study is biased; the outside observer may generate artificial changes in the observed group's behaviour. Moreover, the observer should not be distracted by the action but remain detached.[31] Nevertheless, the observation aims to report the facts as accurately as possible. The additional elements collected make it possible to complete the trainers' discourse, especially if the trainer implements motivational

strategies that are not explained during the interviews. After obtaining institutional consent, three different simulation sessions were observed at the simulation centres in the spring of 2017. The observer was the same person as the interviewer. We used a grid that lists the different moments of a simulation session (briefing/play/debriefing) as well as the behaviour of the trainers and students observed. The Debriefing Assessment for Simulation in Healthcare (DASH)© Handbook and Rating Forms designed to develop debriefing skills were a source for the elaboration of our observation grid.[32] By comparing the observed facts with the recommendations in the literature in order to motivate students and actively involve them in their learning,[6,15,32] we deduced the missing elements as well as the attitudes or facts that do not correspond to the recommendations.

Results

Interviews

Trainers' interviews

The place of simulation in the training course. Four trainers were interviewed.

For three trainers, simulation essentially finds its place in knowledge integration modules, as these involve several types of knowledge coming from different lectures and clinical situations. One of these three trainers said: "*It is necessary to progress step-by-step and to follow the evolution of their learning program*". Another trainer insisted on the proper integration of this tool within a global training program based on a rationale. Moreover, we had to be careful not to put first-year students in an uncomfortable situation to preserve their emotional security as they do not have a robust background yet.

For trainer number four, simulation takes place in the first semester in order to intersect all the theoretical courses given previously. In the first year, students benefit from a formative simulation followed by an evaluative simulation which takes the form of a clinical examination with structured objectives on a standardized patient.

First steps in the preparation of a simulation session. Different preparatory elements for a simulation session were discussed.

All the trainers highlighted the objectives of the simulation session as one of the first elements of preparation. Trainer number three said: *"I like to define a single educational goal and various operational goals"*. Moreover, trainer number two said: *"Depending on the objectives, it is not always simulation that will be the most relevant teaching method."*

Trainers number one and four agreed that scenarios should be easy to play. You have no right to trap students. In contrast, trainers two and three stated that the scenarios were complex. Complexity and difficulty varies according to objectives and level of training. Nevertheless, all the trainers interviewed said that they included a clinical context representative of real life in their scenario. This puts the student in a situation with one or more problems to solve.

Submission and test of the scenario. All the trainers always submitted their scenarios to colleagues. Two trainers also submitted the scenarios to resource persons in order to achieve clinical relevance.

All the trainers had tested their scenarios, whether with a peer, assistant or students. The goal was to set aside questions such as time, equipment and other logistical issues.

Presence of professional actors. Only trainer number four used actors who played the role of the patient while the other trainers used students. These actors were selected within a pool according to the needs. They were briefed by the trainer.

The other three trainers mentioned the cost and lack of medical and healthcare background of the actors, increasing the risk of overplaying and, consequently, limiting the benefits for the students.

Definitions of motivation and implementation of motivational strategies. The various definitions given and the strategies used by the trainers are presented in Tables 1 and 2.

All the trainers needed time to reflect before formulating a definition of "motivation".

Students' perception of motivation in simulation versus lectures. The trainers unanimously agreed that the students are more motivated in simulation than in lectures, as they are put into action, invited to express themselves and interact. Trainer number three nevertheless raised the reluctance of students to volunteer for the first play.

Students' interviews

Students' profiles. The seven students interviewed were between 22 and 30 years old. Their average age was 23.5 years. Three of them were in their second year of training and the other four in their third year of training. Four girls and three boys made up this panel.

Definitions of motivation. The definitions given by students are presented in Table 3.

Defining the term "motivation" was a delicate issue for all interviewees. More or less relevant and complete definitions were made (Tables 1 and 3). However, in all the definitions given, this notion of "elements that push someone into action" is present in the French dictionary.[8]

Motivational elements in simulation and their corresponding manifestations. The various motivational elements evoked by the students during a simulation session are represented in Table 4. For each motivational element, the related consequences or manifestations are also listed in Table 4. At this stage, it may be useful to refer to Fig. 2.

Students unanimously agreed that simulation is a useful and even indispensable tool for learning. Two students underlined that it is nevertheless important to have theoretical knowledge beforehand.

Students' feelings. Before the simulation session, five of the seven students interviewed said they felt stressed or "*completely freaked*

Table 1
Definitions of motivation according to the trainers.

Trainer's number	Proposed definitions of motivation
1	*"To give you the means necessary to achieve your goal"*
2	*"Being pushed to do something, means an effort that can sometimes be uncomfortable"*
3	*"A set of processes that will measure your commitment to a specific activity. Motivation is related to many exogenous and endogenous factors"*
4	*"Motivation is the satisfaction of the students, to realize that in the end the students are learning. This is the partnership I have with them"*

Table 2
Implementation of motivational strategies by trainers.

Trainer's number	Motivational strategies
1	*"Tell them: tomorrow you'll be a radiographer, and here we'll give you the opportunity to project yourself without any consequences"*
	Spend time on briefing: "play down the importance of the process (camera, sense of judgement), explain how it can be useful to them"
2	*"Present the context, recontextualize them in relation to their experience as future caregivers, so that they find a personal interest"*
	"During debriefing, let them express themselves, they are able to find the answers for themselves, to challenge and co-build … they play an active part and put themselves in a position to get ahead and therefore have a certain motivation"
	"We are typically in socioconstructivism, the trainer is only a mediator"
3	*"There must be regular stimuli: anecdotes, humor. We need a multi-sensory approach: auditory, visual with video, touch with demonstration"*
	"Trainers' recognition of student performance is good, but peer recognition is even better"
	"The key word is to work on cognitive dissonance: working on the gap between what is happening and what is prescribed, to bring out these compromises, which are an open door to debriefing. The students are in a reflective posture"
	"They can break through social barriers, they're no longer students but radiographers without risks for them, nor for the patient"
4	*"To have an actor who reacts … to be able to talk about it, to interact: why, when, how"*

Table 3
Definitions of motivation according to the students.

Students' number	Proposed definitions of motivation
1	*"When you want to learn, to expand your knowledge, you go ahead without waiting for the trainer to come to you"*
2	*"Wanting to do something, there's a purpose in doing it, not necessarily a reward but that it brings something"*
3	*"Wanting to do something, participating, observing, listening"*
4	*"Do anything to achieve a goal; take an interest in what you do"*
5	*"To appreciate something, to do it and to succeed; something beneficial for us"*
6	*"A motivated person participates, gets up in the morning saying it's cool I'm going to learn things today"*
7	*"A person who wants to learn"*

Table 4
Elements motivating students associated with the various consequences.

Motivational elements	Manifestations
"Be active"	*"We're gonna learn things, be a better professional"*
"I've never been confronted with this situation before"	*"Extends student discussion beyond the session"*
	"I enjoy what I do more"
"Having to think, having to be creative to solve the problem"	*"Enjoy the simulation more"*
"The choice of the pair is free"	*"I take more pleasure in what I do"*
"I feel reassured, trainers always have a positive remark"	*"It's reassuring"*
"We realize we make mistakes, even if we make them, it doesn't matter"	*"It creates links between us"*
"We have an opportunity to evaluate ourselves before we're put in a real life situation"	*"Greater involvement"*
"All the students participate, we get constructive feedback on our actions"	*"I persevere, take the time to look for information"*
"A good promotional atmosphere"	
"To be able to show what we can do, to prove that we can be trusted"	

out". They were worried because they had no idea what to expect, if they were going to have enough time to go through the script. They were afraid of being judged and criticized by trainers or other students. Two students also mentioned moral pressure, the obligation to succeed, the fear of making mistakes. Nevertheless, they were all well aware that this simulation session was beneficial for them and that they were allowed to make mistakes. Two students were not stressed because "*it was just a simulation*". They said they were enthusiastic and curious.

During the play, the initial stress present in most people disappeared. Everyone enjoyed playing in pairs: "*I have the feeling that I can offload some of the pressure onto the other*".

Most of the instructions given by the trainers to the students were clear. However, two out of seven students wanted more information about the duration of the play and what was expected of the participants.

The various quotes that refer to students' perceptions of the fidelity of the reconstructed environment are presented in Table 5.

Observation grid

According to the different times of a simulation session, attitudes or behaviours of the trainers or students were identified. The elements absent or not in accordance with the recommendations during these observed sessions were deduced by referring to the literature.[6,15,32] A summary of these different elements during briefing, play and debriefing is presented in Table 6.

Discussion

During the simulation sessions, the trainer has full control over how to conduct the session as well as on the working environment. The trainer can implement different motivational strategies so that students have a high level of perception of the three components of student motivational dynamics.[15]

The following discussion will be constructed according to Viau's motivational dynamics model.

Perception of task value

As a reminder, "interest" and "utility" refer to the perception of task value described by Viau.[15] All the students interviewed found the simulation useful for their learning. The trainers took the time to justify it during briefing. Simulation gives them meaning insofar as it meets precise and systematically announced objectives.[6]

Table 5
Perception of the fidelity of the reconstructed environment.

Positive elements	Negative elements
"I took care of the patient like in a real care department"	*"I was more attentive to the patient's questions … the questions are more intense since it's a simulation"*
"They were really patients"	*"We would have engaged in more conversation to reassure a real patient"*
"When you start playing, you easily forget about the cameras and then our professional role takes over"	*"He remains young even if he simulates a 70-year-old patient, we don't have the notion of risk that one would have in real situation"*
"We forget we're playing a script"	*"Patients didn't know their name, date of birth, we acted as if they knew them"*
"Scenarios match reality"	*"The actors always overact, their reaction is not that of a real patient"*
"Act quickly as would be the case in a professional situation"	*"I was thinking a lot about how it was going to happen in the play"*
"We're in reality mode"	*"I wouldn't have done it in real life, there was no bin and my gloves weren't really dirty"*
	"The technical equipment is not the same"
	"We need to get into school mode: conflict between what we learn at school and practices in the field"
	"The radio snapshot we make is not here"

Table 6
Elements observed and not observed during briefing, play and debriefing.

	Observed	Not observed or not in accordance with recommendations
Briefing	The trainer takes the time to justify the usefulness of the activity	Students' expectations are not explored
	Teaching objectives are announced	The type of situation is not communicated upstream to students, however they know that they will practice in the field of projection imaging
	The instructions given are clear	
	Students are reassured (confidentiality, no judgement, right to error)	
	A fictional contract is more or less explicitly established	
	The constitution of the pair is left free	
Play	Observers have an observation grid	For 1 duet out of 3, the play must be played within a time limit of 15 min
	Observers are attentive, exchange between peers	
	Learning is contextualized	
	For two out of three pairs, the pair has enough time to play	
Debriefing	Students are invited to express their feelings at the beginning of the debriefing process	One trainer adopts a transmissive posture: a large amount of speech, sharing his experience, expertise and anecdotes
	The knowledge related to the objectives is summoned	For 1/3, a summary of key elements is not proposed at the end of the session
	The trainer provides constructive feedback	
	A climate conducive to learning is present (engaging learning environment, respect, collaboration)	
	The term axis of improvement is always preferred to that of error by the trainer	
	All participants are asked to speak	

The trainers paid particular attention to the scenario in order to achieve clinical relevance by submitting it to various people. All the trainers said they had tested the scenarios to make sure they were realistic. They created a context that gives meaning to the students' future professional practice.

Debriefing is an important part; confrontation of different viewpoints among all the participants creates new knowledge that can easily be transferred to new situations.[25] The observations allowed us to note that all the participants were invited to question themselves (Table 6). In order to increase students' perception of task value, the trainer could have explored students' expectations and align them with the session objectives[6]; according to our observations (Table 6), this was never done on this panel. It should be noted that if there is a significant gap between students' expectations and the trainer's objectives, a negative effect on the perception of task value is produced.[6]

The desire to work in an authentic environment was present among all the trainers and shared by the students. The simulation areas where the plays were held conform to actual X-ray rooms. One student said: "scenarios match reality" (Table 5). "*Realism is important as is scheduling the event to ensure maximum benefit*".[33]

However, some students raised a number of issues that needed to be considered to improve the realism of the simulation situation and thus increase their perception of task value.

The patient's role is an element that influences the authenticity of the scenario.[21] It is essential to take enough time to fully inform the person who plays the role of the patient, whether student, trainer or professional actor. For example, students report not knowing their name and date of birth (Table 5). Despite the use of accessories (walking stick, clothing), if a young person (here a student) plays the role of an elderly patient, he or she does not take into account the potential fall of an actual elderly person (Table 5). On the other hand, one trainer stressed the fact that it remained interesting for students to play the role of the patient in order to go through the experience (exam duration, rigid and cold table). According to the students interviewed, even if the patient was played by an actor respecting criteria of age, sex and morphology, the play was felt as "unreal" due to excessive reactions that do not correspond to those of a real patient. To bring in the expected added value, actors must be carefully prepared by trainers to reproduce clinical signs, emotional reactions and the pain of a real patient. The answers and attitudes expected from these actors can be recorded in a document made available to them.[21]

Trainers also have to face an evolution in the architecture (technology and design) of field equipment, which students do not necessarily find during the simulation. A student said: *"The technical equipment is not the same"*. One solution would be to carry out an in-situ simulation, which would be possible thanks to a stronger partnership with clinical medical imaging departments.

Trainers also have to worry about details: for instance, one student mentioned difficulties managing his supposedly dirty gloves which were not really dirty during the simulation session.

Other students confront the *"school mode"* with the *"real clinical mode"*, which raises disparities between the teaching of good practices and the clinical reality. However, the group showed signs of adaptability, generating reflexivity.

Perception of competence

Perception of competence impacts student participation in learning tasks.[34] It was extremely important for the students to have as much information as possible beforehand, which encouraged them to participate in the play. Most of them were stressed before starting the session: fear of judgement, fear of doing wrong. Before any simulation begins, trainers help participants to have a clear understanding of what is expected of them.[32]

The time allotted to briefing by the trainer should be long enough to reassure the students and get them involved: confidentiality, respect, right to error, fictional contract, collaboration to create an engaging learning environment.[32] The trainer's clear instructions helped reduce students' anxiety. All these elements increase students' perception of competence. One student agreed that the good atmosphere allowed him to get more involved (Table 4).

Simulation requires students to invest their ability to succeed. This cognitive commitment must be in line with the average difficulty of a scenario so that the challenge it raises remains accessible and can finally be met.[6] One student said that the motivating element of the simulation was the opportunity to show their abilities, to prove that they can be trusted (Table 4). This notion of "challenge to be overcome" was perceptible in the students' interviews.

Following the observations made during debriefing, the positive elements were systematically highlighted and suggestions for improving the practice were made. One student said: *"I feel reassured, trainers always have a positive remark"*. The term "error" was never pronounced during the observed sessions. Most of the trainers provided constructive feedback (Table 6). Of all the observations made, only one trainer adopted a rather transmissive posture (Table 6). Trainers should always keep in mind that their mission is to guide students in their own construction of knowledge and not to adopt a transmissive posture, closer to that of a lecture.[32]

Perception of controllability

The perception of controllability is expressed when the trainer gives the students a certain degree of control over their environment, over what they are asked to do.[6]

Following the various observations made (Table 6), by participating in a simulation session, the students have the opportunity to make choices: even if the trainer decides how many students take part in the scenario, the students can freely choose their play partner. A role-playing "couple" is more like real life and this choice left to the students allows them a greater degree of control during the simulation session. One student said *"I take more pleasure in what I do when the choice of the pair is free"*. By acting positively on the student's perception of controllability, the trainer activates one of the motivational levers, described in particular by Viau.[15]

Challenges for training institutions

Currently in France, few radiographer training institutions have such a tool. Institutions face various constraints:

- a need for a surface area equivalent to that found in real life for each modality (diagnostic radiography, CT, MRI, radiotherapy, nuclear medicine),
- a need for a large number of heavy equipment corresponding to the different specialities in which radiographers practise (eg. X-ray tube, CT and MRI scanners, linear accelerator, gamma camera) combined with other equipment such as hospital beds, stretchers, armchairs, leaded enclosures,
- a need for trainers who are competent in simulation and therefore trained in the use of this tool.[6]

All these primary elements are essential to meet the educational recommendations of the training reference system,[35,36] and to recreate a learning environment perceived as authentic by the student, which makes it possible to increase student perception of task value.[14]

Critical analysis of the work

Although it is recognized that observation is biased,[31] it was interesting to observe the simulation sessions as the trainers implemented various strategies to motivate the students, which were not verbalized during the interviews. Perhaps a self-analysis of teaching practice would make this implicit part explicit.

Conducting research in two separate training institutions allowed us to avoid a single educational approach. The proportion of students interviewed is respected between the two training institutions, but that of the trainers is not, due to a lack of availability on the day the data were collected. In order to further expand the responses obtained, it would be interesting to continue this study in other training institutions.

A co-coding of all verbatim comments allowing verification and comparison of the results obtained to minimize pre-design bias[37] was not made.

Conclusion

To our knowledge, this work is the first that identifies the motivational strategies used in a role-play simulation context and that identifies strategies that resonate with student radiographers.

The results showed that role-play simulation has a positive impact on the motivational dynamics of these students, even if they all claim to be stressed beforehand, as different strategies are devised by a trainer specialized in the field of simulation. It seems essential to us that the trainer reflect on the strategies to be implemented in order to encourage student motivation.

Three areas of improvement have been derived from this work to further improve the students' motivational level:

- exploring students' expectations in advance,
- give importance to patients briefing so that they can fully perform their role,
- improving the authenticity of the professional environments.

The latter can be addressed through a better access to varied and modern equipment in training institutions (imaging equipment, care equipment, audiovisual equipment). The procurement of such resources is in line with current national and European educational guidelines.[1–3]

In addition, trainers involved in role-play simulation should gain specific knowledge and skills to properly manage this type of education. Training and coaching of trainers in this supervisory role seems essential.[6] Based on our experience, and to follow the educational recommendations,[35,36] we believe that each radiographer training institution should have members with an expert

knowledge and qualification in pedagogy/simulation (eg. University certification, master's degree, PhD).

Conflicts of interest

The authors have no conflicts of interest.

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