

Article

# SG-ACCORD: Designing Virtual Agents for Soft Skills Training in the School Context

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**Abstract:** This study focuses on the behavior of interactive agents and how to ground their implementation in psychology and cognitive modeling to capture fundamental psycho-pedagogical elements to deliver an effective competency-based training and assessment tool for teachers, trainers, and educators working in the school context. The study describes the design and implementation of a Serious Game, “Attain Cultural Integration through CONflict Resolution skill Development” (SG-ACCORD), to develop and assess soft skills that are pivotal in educational working contexts (i.e., negotiation, effective communication, intercultural conflict management). The SG-ACCORD has been developed by applying a tailored methodology, namely the Educational Technology-enhanced Role-Playing, addressing two main facets: psycho-pedagogical (theoretical frameworks) and technological (production of artificial worlds based on computer-simulated models). The game is a single-player virtual role-play offering a series of scenarios reflecting the real-life experiences of teachers in which the role of interactions and human factors is crucial. It focuses on the simulation of a dialogue between two characters (an avatar controlled by a human player and a BOT computer-controlled counterpart), enacting interethnic conflicts between teacher and students within realistic school context scenarios. The SG-ACCORD represents a free, easily manageable, and flexible educational tool that can be used as a stand-alone resource and envisages an automatic feedback and debriefing system.

**Keywords:** automatic assessment tools; e-learning tools; educational games; educational simulations; intelligent tutoring systems; self-assessment technology; personalized e-learning



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## 1. Introduction

Designing credible virtual agents is a fundamental research endeavor for many companies investing in an autonomous chatbot for customer care purposes within the realm of the fast-growing internet service market. At the same time, designing agents for training and psycho-pedagogical purposes in simulation and role-playing scenarios is an equally increasing field that is transforming the traditional landscape of training practices and instruments [1].

Many virtual agents used in communication skills training simulations are based on human-authored dialogue instead of computer-generated dialogue. It is considered the golden standard in the natural language generation field. On the other hand, human-produced language may be affected by authors' personal characteristics (e.g., gender, power status, cultural orientation) that need to be considered when creating a dialogue [2].

The process of designing the behaviors of such agents is an interdisciplinary effort that requires the cooperation of many specialties: psychology, cognitive modeling, and artificial intelligence, as well as graphics.

We are interested in the effective usage of internet technologies to tackle the training of soft skills and competencies in which the role of interactions and human factors is crucial [3].

Therefore, this paper focuses on the behavior of an interactive agent and how to ground its implementation in psychology and cognitive modeling. The aim is to capture fundamental psycho-pedagogical elements necessary for delivering effective training on interethnic conflicts management in school context delivered through a web-based application, called Serious Game (SG)-ACCORD [4–6]. We are interested in designing and implementing agents based on human-produced language, which can interact with human beings instead of embodied conversational agents embedded with personality traits that can interpret automatic communicative behavior [7,8].

This paper aims to introduce a methodology used to develop Educational Games based on Situated Psychological Agents that incorporates theoretical and methodological aspects of theories for modeling the simulation and the human-agent interaction and conversation regarding a specific area of the domain [9]. This allows defining a standardized method to draw the content of the interactions and the psychological features of the avatars interacting with the user that does not depend on automatic elaboration and recognition processes.

The game is a single-player virtual role-play designed as a practical experience to complement a Massive Open Online Courses (MOOC) (five units) dedicated to teachers on interethnic conflict management in the classroom. The MOOC is available at <https://accordgame.com> (accessed on 1 January 2022), produced as part of the EU project ACCORD involving five EU countries, i.e., Italy, Spain, Austria, Germany, and Belgium.

ACCORD aims to address the priority of education and training at the EU level that regards the crucial need to prepare teachers and educators to take an active stand against all forms of discrimination and racism and be able to deal with diversity and handle emerging conflicts.

Awareness of cultural diversity and intercultural communication elements, enhancing negotiation and mediation competencies, are key soft skills supporting teachers and educators to prevent prejudicial and discriminatory behaviors, not necessarily purposefully exhibited by teachers or other actors within the usual educational contexts [10].

The existing policies aim to redress the disparities in educational outcomes between native and children with a migrant background and favor inclusion and integration, with the urgency of offering curricula tailored to the specific needs of the diverse groups of migrant students.

This results in an integrated approach to making a more inclusive education system that should ideally include a combination of elements, such as linguistic and academic support, parental and community involvement, and intercultural education [11].

In this context, the ACCORD project aims to provide an innovative platform providing pedagogy and assessment methods to help teachers and educators enhance and (self-) assess their intercultural competencies and negotiation abilities. The platform is based on recent psychological modeling through current Information and Communication Technology (ICT) research (e-learning, mobility, Internet, artificial intelligence).

This is to overcome geographical and resource obstacles that often hinder teachers' access to professional training and assessment schemes in intercultural communication and conflict resolution within the educational sector.

The main aim of ACCORD is to provide a training system that complements theoretical and practical aspects of interethnic conflict management in the school context. This tool includes (1) the production of theoretical training material on the subject in the form of a MOOC; (2) the development of virtual role-playing game scenarios. The tool allows secondary school teachers to experience intercultural conflict dynamics and enhance intercultural awareness and communication competence. These skills are considered essential to effectively interact with pupils from other cultures. Playing users can develop hands-on expertise in more effective intercultural communication approaches, resolving intercultural misunderstandings and conflicts, and understanding the relationships between the individuals in a multicultural group and conflict resolution styles.

The project is focused on the increasing changes involving the modern educational context worldwide. It requires teachers to possess a broader range of skills to adapt their

practices to handle the growing complexity of classroom management, in particular, conflict resolution management, as one of their main challenges.

The educational context plays a key role in building more inclusive communities. Specifically, within the current society, teachers are required to effectively foster high-quality learning outcomes, mutual understanding, respect, and integration of migrant and minority students. Nonetheless, despite several efforts at the Pan-European level to support teachers in engaging in culturally qualified educational practices, this aim is far from being achieved and thus takes high priority on the European Commission's action-research agenda [12]. Therefore, this study sought to target this pivotal aim.

Specifically, nowadays, conflicts with students from the new generation have become increasingly complex, deriving from misinterpretations and disturbing behaviors during class and from perceived differences between teachers and students in worldviews, ideologies, cultures, and objectives [13,14]. Therefore, it is crucial to focus on teachers' ability to adequately and effectively handle conflicts that may arise with students. That means appraising conflicts as opportunities for development and enhancement of skills, critical reflection, and growth at personal, interpersonal, and group level, as well as adopting constructive and creative conflict management strategies without disrupting the educational goals and learning objectives and without affecting relationships with students and the class harmony [10,15,16].

From this perspective, we will describe the designing of the behavioral and emotional features of interactive agents for the ACCORD game scenarios that focus on negotiation processes within teacher–student conflictual interactions and integrates different theoretical models, capturing key psychological dimensions: Rahim conflict management model [17], Multicultural Personality theory [18], the assertive model of communication [19], and the theory of universal basic emotions [20,21]. We are aware of how the design of virtual agents is profoundly affected by the personality, cultural identity, and language used when speaking about emotions and relational competencies [2]. Moreover, assuming that cognition and context are bound, we designed those scenarios to reflect the different teachers' learning contexts and cultures. Virtual characters based on 3D graphical simulation in training applications are the main means for creating and developing content and scenarios [22].

Within the ACCORD project, the models that have been used to create avatars tie heavily with research in psychology and social science, hence, with the design of believable socially intelligent characters able to invoke meaningful user responses.

Specifically, the SG-ACCORD focuses on the simulation of a dialogue between two characters (an avatar controlled by a human player and a BOT computer-controlled counterpart), during which behavioral characteristics (e.g., the act of communicating along with nonverbal elements of body language) play a fundamental role [23]. Furthermore, considering that SG-ACCORD is designed as a single-player game, the possible interactions that can be entertained with the artificial agent (BOT) simulated on the computer are based on the operationalization of well-defined variables specified by defined psychological theories.

#### *Virtual Role-Playing Game for Soft Skills Training*

Nowadays, research demonstrates that digital games are particularly suited to foster the development of the twenty-first-century competencies (e.g., communication, collaboration, systems thinking, creativity) [24,25], by promoting the active construction of new knowledge [26], and by offering the opportunity to players to experiment with new identities [27].

This is also true with regards to the school context [28,29]. In this respect, there is also an increased interest in online games specifically inspired by role-playing techniques and principles [3] to be designed and used in training contexts as a medium for learning [30,31].

Originally, the role-play technique derives from psychodrama [32] and exploits its learning potential through the interactions between members of a group through the enactment of various instruments. Although its origins lie in group processes, this technique can be applied to situations involving a dyadic relationship, with the gain of concentrating

on the specific emerging dynamics without the necessity to consider the complexity of those that can arise in group contexts.

In the last decade, the development of the Internet and the exponential increase in computing power has led to the growth of online games and the innovative domain of applications based on artificial and digital environments. This has allowed connecting large groups of people for a considerable length of time, contributing to the development of community culture sharing common interests and objectives.

The development of the Internet and the exponential increase in computing power has led to the growth of online games and the innovative domain of applications based on artificial and digital environments. This has allowed connecting large groups of people for a considerable length of time, contributing to the development of community culture sharing common interests and objectives. Several examples of how the role-plays transferred to virtual environments have been used (i.e., by complementing face-to-face activities, providing stand-alone solutions, and by envisaging single-player or multiplayer interactions) in education training contexts [33–35].

There has been a growing recognition that interdisciplinarity and synergy in collaborations among psychologists, researchers, educators, trainers, and game developers are crucial for defining a shared system of principles that could drive the development and implementation of games as meaningful learning tools [3]. Those principles should respond to the challenge of creating inviting and immersive virtual settings and agents to ensure meaningful learning [36]. These virtual agents and environments should engage the user through exchanges recalling real-life reactions and experiences, possess the successful features of the entertainment games, and provide a tailored system of feedback that could ensure the transference of acquired competencies to real-life situations. As people tend to anthropomorphize or personify computers and virtual agents, they are likely to respond to them as they would to real humans. This tendency could be exploited to support the psychological and pedagogical game models by designing avatars with which users can interact, able to express emotions and communicate nonverbally through posture, gesture, stance, and movement.

These are useful to support the psychological and pedagogical models to which the game is inspired.

Our interdisciplinary research group brings together different expertise (psychologist, pedagogic, game developer, graphic designer) to devise effective educational games based on psycho-pedagogical concepts and simulations. We have developed a methodology to address the challenges of designing and implementing what we have defined as Educational Technology-Enhanced Role-Playing Games based on two main dimensions: psycho-pedagogical and technological [3,9].

The starting point for designing an educational game consists in identifying the soft skills we aim to train or assess, and it is implemented by following the definition of three interrelated architectural elements: (a) the visible layer, the aspect of the game to which the players interact with; (b) the hidden layer that represents the inner core of the game and all the modeling aspects that specify the psycho-pedagogical elements and the communicational features expressed by the artificial agents; (c) the evaluation layer where the assessment elements of the game are defined.

## 2. Theoretical Aspects Underpinning the Hidden Layer

The hidden layer embeds specific psycho-pedagogical assumptions to be trained and transferred in the game. It is explicated by a set of variables expressing the complex behavior of the agents on which the user can act to develop the game's plot. These variables include how the agents communicate verbally and nonverbally, the type of emotion and reaction shown, and the circumstances in which they are expressed.

From this perspective, the process of designing narratives of the game scenarios and, more specifically, the behavioral and emotional features of the artificial agents through and with which the user would interact in different conflicting scenarios is inspired by various

theoretical models: Rahim conflict management model [17], Multicultural Personality theory [18], the assertive model of communication [19], and the theory of universal basic emotions [20,21].

### 2.1. Rahim's Model of Conflict Management

Regarding the ability to handle interpersonal conflicts, Rahim [16] differentiated five different styles (*obliging, dominating, avoiding, integrating, compromising*) on two basic dimensions: concern for self (the degree to which a person aims to satisfy his or her own concern) and concern for others (the degree to which a person aims to satisfy the concern of others). The five styles are described below.

The *obliging style* implies overriding concern for the other party's goals (e.g., "I try to satisfy my students' expectations"). Teachers who employ this style attempt to maintain a positive climate in the classroom, and they tend to acquiesce to students' needs and smooth over the conflict by appeasing them. When competently used, it reduces the tension and regulates interaction with the student, not to the detriment of exploiting the task or relationship. There may be immediate positive effects of using this style (e.g., reducing anxiety, avoiding guilt, etc.). However, if inappropriately used, it results in responding to conflicts by compromising the role as teacher and interactions regulator. Teachers may use this style to "pass the buck", delegating choices and decisions to others to avoid responsibility and blame.

The *dominating style* (one-sided concern for own personal goals) controls the conflict by overpowering and suppressing interlocutors (e.g., "I sometimes use my power to win in a competitive situation with my students"). However, teachers may use it appropriately in those conflicting intercultural situations when a decision must be made immediately or when, in class, a person in authority must make a decision based on their special knowledge, skills, or experience. In this case, the dominating style may limit an adverse decision by the student that may be harmful to him/her or others (problematic behaviors). On the other hand, because it may be perceived as ineffective, teachers should be cautioned to engage that style when they think it can be successful and therefore consider students' individual differences. If a teacher misuses this style, he/she tends to impose his position or decision along with depreciation, often ignoring the needs and expectations of the students involved in the interethnic conflict.

The *avoiding style* reflects minimum concern for oneself and others (e.g., "I try to avoid unpleasant exchanges with my students"). A teacher using this style can hardly be considered an appropriate style of handling intercultural conflict. This sidesteps responsibility for addressing students' issues within the classroom setting; she stays out of a situation or remains neutral. The teacher does not exercise her role of the regulator and does not feel responsible for regulating interactions between peers, exploring the dynamics and possible causes (individual, familial, social) behind the interethnic conflict in class. Teachers using this style do not hear, see, listen, nor openly promote solutions in conflicting intercultural situations, and they may decide to leave the class, change the topic so the conflict will no longer be an issue, or let someone else solve the problem.

The *integrating style* reflects high concern for both oneself and others (e.g., "I exchange accurate information with my students to solve a problem together") and tends to use creative problem-solving solutions to satisfy both teacher and student involved. This style involves dynamic, constructive, and generative processes within conflicting intercultural situations. Therefore, it implies that teachers and students can put available resources to use in creative solutions—to allow and encourage open discussion of others' preferences and opinions and promote constructive feedback. When adopting the Integrating style, there is a genuine interest in understanding the causes of intercultural conflict, and there is space to understand the most appropriate interventions. However, integrating solutions requires time to brainstorm, exchange information, check differences, and think of original alternative solutions to pursue mutual goals successfully; sometimes, conflicting intercultural issues may require a more rapid resolution.

Finally, the *compromising* style reflects intermediate concerns for self and others (e.g., “I usually propose a middle ground for breaking deadlocks”) and is expressed by managing the conflict through a compromise. Teachers may find a compromising style an appropriate way to handle intercultural conflict. It may seem a relatively safe problem-solution approach that allows maintaining relationships, easiest to work toward, least dialectic, and quicker to accomplish than the Integrating style.

## 2.2. Multicultural Personality Theory

Van Der Zee et colleagues [18] have summarised the complexity of intercultural personality characteristics to five main dimensions of intercultural effectiveness: *cultural empathy*, *open-mindedness*, *flexibility*, *emotional stability*, and *social initiative*. The individual ability in *cultural empathy* refers to the sensitivity and willingness to adapt to feelings, thoughts, behaviors, and social norms of individuals from different cultural backgrounds. *Open-mindedness* is defined as an unbiased attitude toward other ethnic and cultural groups and social norms and values. *Flexibility* describes the ability to make necessary adjustments to unknown situations, determining social acceptance. *Emotional stability* represents the ability to self-regulate and maintain calmness in stressful situations. *Social initiative* is the tendency to approach social situations with purposive actions aimed at building a sense of connectedness.

The ACCORD project moves from the interest in connecting two key dimensions in secondary school teachers and educators: (1) The relevance of possessing specific personality characteristics for teachers and educators for efficiently dealing with the actual increasingly multiethnic school context, and (2) The importance to efficiently manage conflicting interethnic situations in the interactions with students.

## 2.3. Assertive Model of Communication

Galassi and Galassi [37] have defined the assertive behavior as “that complex of behaviours emitted by a person in an interpersonal context which express that person’s feelings, attitudes, wishes, opinions or rights directly, firmly and honestly while respecting the feelings, attitudes, wishes, opinions, and rights of other persons”. Assertive behavior is learnt and situationally specific: i.e., it depends on the individual’s perceived situation [37]. Moreover, Dryden and Constantinou [18] have identified three styles of communication, namely *passiveness* (complying with the wishes of others), *assertiveness* (mutual respect), and *aggressiveness* (not considering other people’s ideas or feelings), and verbal, nonverbal, and paraverbal indicators characterizing those styles.

## 2.4. Theory of Basic Universal Emotions

The theory of basic universal emotions describes a set of basic emotions recognizable from the facial expression regardless of cultural and linguistic differences and linguistic abilities [20,21]. This set of basic universal emotions (e.g., shame, guilt, and contempt) is fundamental to human evolution. They organize and motivate physiological, cognitive, and action patterns and facilitate adequate adaptation to the environment’s vast array of demands and opportunities. Because cross-cultural, this model appears particularly suited for defining emotional expressions of the SG-ACCORD game’s avatars that involve interethnic conflicts that may occur between people from different cultures and to be employed in different EU countries. This perspective and the cultural lens held by considering various theoretical models in our design process allows us to identify meaningful aspects in the perception of emotions.

## 3. Materials and Methods

The development of SG-ACCORD involved the use of multiple methods. For data collection, the procedures undertaken comprised qualitative and quantitative instruments such as focus group sessions and the utilization of questionnaires.

Firstly, a Training Needs Analysis was conducted by organizing focus groups with target group representatives to define the conflicting scenarios, avatars' features (visible layer), and behaviors. Moreover, a semistructured questionnaire containing the key issues to be explored during the focus group was produced and administered. The proposed semistructured questionnaire outlined seven questions presented to teachers to gather: (1) feelings, reactions, possible ways to act and manage the conflict underpinning the conflict management styles theorized by Rahim [17], and (2) information about how they practice empathy within the relationships with their students and foster empathy within students. More precisely, we developed a checklist based on the conflict management styles described by Rahim [17] to analyze teachers' reactions and ways to manage exchanges and conflict with students by extrapolating elements related to the Rahim conflict management model. The purpose was to direct group discussion, stimulate conversation about the research topic, and ensure that all the desired information was sought to be included in the design of game scenarios.

Moreover, along with the semistructured questionnaire, after each scenario discussion, teachers were asked to complete the Differential Emotions Scale [21]. Our aim was to explore: (1) whether, after reading the scenario contents, they were experiencing any of the ten feelings and related emotional intensity found on the emotion scale (surprise, anger, fear, disgust, distress, interest, contempt, joy, guilt, and shame) and (2) the emotion they think the student involved could have experienced in the same situations.

In addition to the focus group sessions, an online survey was conducted across the partner region to trawl other views and insight on the intercultural competencies and conflict management styles adopted by secondary school teachers within teacher–student interactions.

The survey included open and closed-ended questions to collect demographics and factual information and two internationally known questionnaires, one related to multicultural personality (Multicultural Personality-Questionnaire- Short Form, MPQ-SF) [17], and the other to conflict management styles (Rahim' Organizational Conflict Inventory-II, ROCI II, Form B) [16].

The MPQ-SF is a 40-item instrument aimed at measuring the five dimensions relevant to intercultural success: cultural empathy (8 statements), open-mindedness (8 statements), social initiative (8 statements), emotional stability (8 statements), and flexibility (8 statements).

The ROCI-II measures the 5 conflict management styles (integrating, avoiding, dominating, obliging, and compromising) identified by Rahim. It consists of 28 statements on a 5-point Likert scale measuring five independent dimensions of the styles of handling interpersonal conflict: 7 statements for Integrating (IN), 6 statements for Obliging (OB), 5 statements for Dominating (DO), 6 statements for Avoiding (AV), and 4 statements for Compromising (CO). The instrument contains Forms A, B, and C to measure how an organizational member handles conflict with supervisors, subordinates, and peers. The survey was made available online and widely diffused through partners' teachers' and secondary schools' networks. All procedures performed in the present cross-sectional study were in accordance with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. All participants completed the questionnaire on a voluntary basis, and they were fully informed about the aims of the study and the confidentiality of the data. Every precaution was taken to protect the privacy of research subjects and the confidentiality of their personal information, and the questionnaires were anonymously completed. The participants' health, dignity, integrity, and rights were preserved, and data were collected with no physical and psychological hazards for research subjects.

Therefore, findings were used to design and implement ACCORD e-platform contents, including the SG-ACCORD.

Finally, a testing phase was implemented. It consisted of two stages: preliminary validation of the ACCORD e-platform and a final version evaluation.

For the preliminary testing, the first demo of the ACCORD Game was presented to teachers and educators, and feedback was collected for improvements using a 9-item

questionnaire. Descriptive statistics were calculated, and Mann–Whitney  $U$  tests were used to compare the scores reported by secondary school teachers and teachers in training.

Afterward, the final version of the ACCORD e-platform, including learning materials, five lessons, the SG-ACCORD, and questionnaires for the evaluation, was made available online to teachers and educators (i.e., English, Spanish, German, Flemish, Italian versions). For the assessment of the acceptance of the SG, a questionnaire comprising 23 items (on a five-point Likert scale ranging from 1 “strongly agree” to 5 “strongly disagree”), based on the Technology Acceptance Model [38,39], was used. It assesses: Perceived Usefulness (2 items; e.g., “Using the Serious Game enhances my effectiveness”); Subjective Norm (1 item; “Colleagues and my organisation have been supportive in using the Serious Game”); Image (1 item; “People in my organisation who use Serious Games have more prestige than those who do not”); Perceived Ease of Use (2 items; e.g., “My interaction with the Serious Game is clear and understandable”); Computer Self-Efficacy (2 items; e.g., “I could complete my task using the Serious Game if I had built-in help facility for assistance”); Perceptions of External Control (2 items; e.g., “I have control over using the Serious Game”); Serious Games Anxiety (2 items; e.g., “Serious Games make me feel at ease”); Perceived Enjoyment (1 item; “I find using the Serious Game to be enjoyable”); Voluntariness (2 items; e.g., “My use of the Serious Game is voluntary”); Job Relevance (2 items; e.g., “In my job, usage of the Serious Game is important”); Output Quality (2 items; e.g., “I rate the results from the MOOC/Serious Game to be excellent”); Result Demonstrability (2 items; e.g., “The benefits of using the Serious Game are clear to me”); Behavioural Intention (2 items; e.g., “I plan to use the Serious Game in the future”). Frequencies and percentages of those responding “strongly agree/agree”, “neutral”, and “strongly disagree/disagree” were calculated.

Furthermore, the Rahim Organizational Conflict Inventory-II (ROCI-II) [17] was administered twice before and after the overall learning experience. The ROCI-II consists of 28 items on a 5-point Likert scale ranging from 1 “Strongly Disagree” to 5 “Strongly Agree”. The sentences covered the five styles of handling interpersonal conflict: Integrating (7 items, e.g., “I try to investigate an issue with my subordinates to find a solution acceptable to us”), Obliging (6 items, e.g., “I generally try to satisfy the needs of my subordinates”), Dominating (5 items, e.g., “I use my influence to get my ideas accepted”), Avoiding (6 items, e.g., “I attempt to avoid being put on the spot and try to keep my conflict with my subordinates to myself”), and Compromising (4 items, i.e., “I try to find a middle course to resolve an impasse”). A higher score represents greater use of that conflict management style.  $T$ -tests were used to compare pre and post mean scores of conflict management styles.

All the statistical analyses were carried out by using SPSS Version 21.

## 4. Results

### 4.1. Focus Groups and Online National Survey

During the focus group sessions involving 70 teachers across different secondary schools of the project countries, a series of hypothetical scenarios of intercultural conflict in the school context has been discussed with teachers, covering their direct experience within the design of the SG scenarios. Those scenarios assume the form of miscommunications and misunderstandings—derived by substantial differences in languages and worldviews—but also of insulting, threatening, actual discrimination, and xenophobic behaviors. Teachers and students may interact with each other by using different communications styles: passive, aggressive, and assertive. In particular, the scenarios addressed: (1) overt and covert expressions of discrimination that may arise during classes, i.e., the adoption of stereotypes and ethnic humor; (2) expressions of racial and religious biases (e.g., intentional or unintentional derogatory/negative comments about race/ethnicity/religion); practices of exclusions (e.g., dichotomization into “us” and “them”); (3) expressions of prejudices and judgmental attitudes derived from members of an ethnic minority group.

The main purpose was to collect information on the designated topic—gather teachers’ perspectives on intercultural conflict management, on intercultural and interethnic mean-



ings assigned to the emerging conflicting situations discussed, identify the conflicts at stake in their local educational contexts, and elicit their training needs to design five different interethnic real-life situation conflicting scenarios (Table 1).

**Table 1.** Intercultural and Interethnic conflict scenarios.

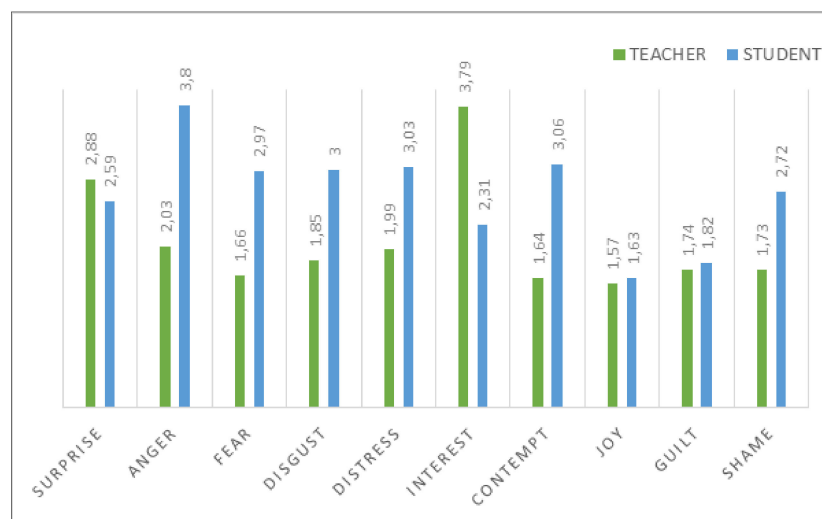
SCENARIOS	DESCRIPTION
Scenario 1: <i>Majority vs. minority cultures</i>	A boy of Ethiopian descent caught the attention of the teacher during class because he was making too much noise. Despite several warnings of the teacher, the student and the teacher get caught up in a verbal conflict. At some point during the conflict, the boy screams to the teacher that ‘history still lingers on’ and ‘white people still treat people of color as slaves’.
Scenario 2: <i>Stereotyping and ethnic humor</i>	During an ICT-Class, a boy of Italian descent forwards an e-mail with a picture enclosed to his classmates. Suddenly, the whole class starts laughing. The picture shows a selfie of two monkeys wearing sunglasses and has a text which says: “this is a picture of us during our holidays in Brazil.” He shouts: ‘Sam’s holiday picture [boy of African descent].’
Scenario 3: <i>Good intentions and stereotyping</i>	The subject of the course today is the exploration of religions. The teacher kindly asks a Muslim pupil to teach the class everything there is to tell about the religion of Islam. The teacher always enjoys it when her own pupils can learn something new. The pupil refuses to accomplish the request of the teacher.
Scenario 4: <i>Racism is exceptional</i>	During class, the subject of ethnic discrimination comes up. The teacher invites everyone to share their experiences. One girl shares the story of how people in the grocery store always look weird at her mother because of the fact that she wears a headscarf. One of the class pupils states that people may not look weird at her because of what she wears but because of the way she acts. Not everything that looks like a racist reaction, at first sight, is racist per se. The Muslim girl becomes furious and responds that this is not true.
Scenario 5: <i>gender and sexuality</i>	The class watched a movie that tackled the theme of sexuality. One of the topics during the movie was homosexuality. After the movie, a discussion in class takes place. A Muslim boy of Turkish descent feels disgusted and shouts that two boys kissing should not be allowed and is completely unethical. The other classmates react and say that ‘the Turkish is a backward culture and Islam is not a religion of modern times.’

As specified earlier, the creation of virtual agents might be significantly influenced by authors’ personality and cultural identity and hence thwart the theoretical principles of the underpinned psychological and communication models.

Thus, the collaboration of teachers of the participating countries has enabled the development of verbal and nonverbal contents of each scenario, considering the richness and diversity of ethnic, cultural, intercultural, and symbolic meanings.

The scenario discussed during the focus group have been transposed into digital environments to become conflicting role/playing game scenarios where teachers can directly experience the dynamics of intercultural conflict in interaction with pupils from other cultures.

Moreover, considering the Differential Emotions Scale, findings were displayed in Figure 1.



**Figure 1.** Emotions scales: teachers' and students' feelings.

The emotions perceived by the teachers and those they perceived in the students were considered a useful indicator of their way of experiencing the conflict situations presented in the scenarios. We have decided to explore not only the perception of negative emotions, such as fear, contempt, anger, distress, disgust, shame, and guilt, but also the perception of emotions such as interest and surprise, which indicates the possibility of keeping a positive involvement in the conflictual situations. Moreover, findings from the online survey allowed a greater understanding of intercultural competencies and conflict management styles adopted by secondary school teachers within teacher–student interactions.

As will be further explained below, this information was used to design behavioral, emotional, and psychological features of the virtual agents in complementing the observable behavioral indicators derived from the assertive communication model.

According to the situated learning approach, all essential information obtained has been transferred into the designing of scenarios, which have been cocreated according to the situated learning approach [40]. The cocreation of virtual scenarios and their implementation in the school contexts provides elements of situated learning [41].

Virtual scenarios simulate authentic situations directly related to teachers' environment and maintain the complexity of the real-life context; they provide a stage for interacting and acting their role, enhancing situational affordances to manage conflicts effectively. As they share and reflect upon educational practice [42] around the themes of intercultural conflict, they contribute and benefit from being part of this community.

#### 4.2. Agent Design: Psychological Model and Implementation of Behavioral Indicators

Within the SG-ACCORD, the user is introduced to the game with a scene representing the show card game explaining the situation, the reason for the conflict, the role he will play, and that guides the player on the stage to interact with the virtual agent.

Every single exchange between the two is organized in five to seven-statement scenes, allowing one turn of speech at the time. The user can select one among five or seven statements (i.e., sentences representing Rahim's styles of handling conflicts) complemented with gesture and facial expression. Each style expresses itself through a pattern of observable behavioral indicators that we have described according to the model of assertive

communication [18]. For each of the five management styles, we have distinguished the following set of variables: verbal (the content of a message, i.e., the words used in a sentence), paraverbal (the way a verbal message is communicated, i.e., pitch and volume of the voice), nonverbal (emotions conveyed during the conversation through the body language). This set of variables is grouped in Rahim's two dimensions, i.e., concern for self and concern for others. This complex set of variables has been used to design the avatars' behavioral, emotional, and psychological features. The conflicting game scenarios have been designed considering the variables, as listed below:

- 1 The Conflict management styles acted by the BOT: Integrating, Compromising, Dominating, Obliging, Avoiding Dominating Appropriate, Obliging Appropriate;
- 2 The Gender: the interactions could be female–female (or male–male) and female–male (or male–female), depending on whether the user and the BOT have the same/opposite gender.
- 3 The Ethnic variables are conveyed by assigning the avatars different physical features to cover the interaction between different ethnic groups.

The combination of such variables resulted in the design of 10 conflicting scenarios with 7 different characters equally grouped per gender and different ethnic variables.

Moreover, the indicators for both verbal and nonverbal communication between the user and the artificial agent have been selected for their applicability and relevancy in the behavioral description of the identified communication styles. The conflicting scenarios have been translated into the five languages of the project countries to empathize specificities of verbal and para/nonverbal communication by acknowledging different possible shades of meaning.

As outlined in the previous paragraph, they can be seen as specific actions or reactions acted by the agent characterizing a particular type of behavioral style that can be objectively observed and measured.

Verbal indicators are embedded in the structure and content of each sentence both in the artificial agent bubble speech and in the five/seven sentence options available to the player at each game interaction step. Some additional verbal indicators are conveyed through the speech gibberish sounds associated with each sentence for both the player and BOT to suggest the prosodic features of the speech of a specific sentence.

Moreover, the different shapes of the artificial agent's speech bubbles represent different vocal tones (submissive, assertive, neutral, resolute, dominating). Each sentence is also associated with some nonverbal indicators conveyed through the avatar's facial expressions and body gestures. More specifically, the non and paraverbal variables related to each of the 5 conflict management styles resulted in 24 animations, 9 idle (expression of the conflict management styles), 4 Moods (facial expressions), and 5 bubble sentences corresponding to the 10 basic emotions derived by the emotional scale model [21]. In line with the rationale of this paper, Izard considers emotion as a form of innate organization that motivates affects and behaviors (not simple reactions to stimulus). Emotions are called basic because they are assumed to have innate neural substrates, innate and universal expressions, and unique feeling and motivational states [21].

The 24 different animations represent body gestures, eye movements, and facial expressions associated with the verbal message, that is, the specific sentences indicating one of the five conflict management styles.

The design of the sentences exchanged between the two actors of the role-playing scenario is based on two main psychological models of handling interpersonal conflict and assertive communication.

As discussed earlier, the content of the exchanges and emotions, the expressions, and the nonverbal behaviors have also been designed according to the results from the emotional scales and semistructured questionnaire presented to the 70 European teachers and the contents of analyses of the focus group discussions.

Each verbal message sentence exchanged between the two actors is constructed according to the following variables for each expression of the different handling conflict styles:

- Interlocutor's statement: whether it is specific, prominent, rumbling, hesitant, and approval-seeking;
- Message expression: whether there is an objective distinction between fact and personal opinions, no distinction, the tendency at putting down preferences (and self); denial of reciprocal preferences;
- Enquiring into others' opinions: by encouraging open discussion, provoking fear, dismissing preferences, moving the discussion away from the conflicting issue;
- Feedback: whether it is constructive, destructive–manipulative, subtle–destructive criticism, and self-deprecating;
- Emotions elicited both in teachers and students by proposed interethnic conflicting situations.

For example, an assertion is evident by the terms used, the modulation of the speech tone, and body language. Therefore, assertive communication using the integrative and compromising styles is characterized by: "I statements" that are specific, brief, and easily understood, e.g., "I would like to"; the distinction between facts and opinions, e.g., "My experience is different from that"; enquiring about others' preferences and opinions, e.g., "What are your thoughts on . . . ?"; and by constructive criticism without dogmatic suggestions, e.g., "I feel disappointed when . . . how about trying this way?". When communicating assertively, an individual would probably utilize para and nonverbal communication such as a steady and warm vocal tone, a vocal volume that fits surrounding, fluent speech pattern with a steady pace while maintaining eye contact, appropriate facial expression, and inviting body movement and posture.

In the same way, when being aggressive by using Dominating/Avoiding styles, a person would probably make use of prominent "I statement", e.g., "I must have"; show no distinction between facts and opinions, e.g., "No, the way to do it is . . . "; enquire and make requests that provoke fear, e.g., "Have you not finished that yet?"; manipulate advice-giving, e.g., "If I were you, I would"; and when communicating aggressively they would probably utilize para and nonverbal communication such as harsh, loud voice, fluent speech pattern with little hesitancy, intense eye contact (staring the other person out) taut facial expressions, and attacking and defensive body posture with gestures such as pointing.

Finally, when being passive by using Obliging/Avoiding styles, a person's behavior would include justifying "I statements" excusing what it is going to be said, e.g., "I am sorry I have to mention"; dismissing personal preferences and opinions, e.g., "It is only my opinion . . . It is not important"; dismissal of opinions, e.g., "I cannot seem to ever get anything right . . . "; rigid self-criticism, e.g., "I am so sorry . . . I know I must". When communicating passively, they will probably use para and nonverbal communication such as soft and quiet voice, a vocal volume that tapers off, uncertain speech pattern, evasive eye contact (looking down), and uncomfortable facial expressions (Figure 2).



**Figure 2.** Obliging style: example of nonverbal communication.

The sentences are conveyed through five different sentence bubbles for each of the different styles of handling conflict (Figure 3) to emphasize vocal volume and tone of verbal messages.



**Figure 3.** Example of the different speech bubbles.

After five interaction states, the player is asked to stop and have a self-reflection moment. The player is invited to think about the interactions she had with the student involved in the conflicting interethnic scenario, select among seven alternatives, end the interaction with the student, and proceed to manage the situation further. For example, the user may choose a completely different style to the predominant one used during the game or confirm her pattern of behaviors.

After each game session, the player is provided with overall feedback regarding her performance and preferred style when managing conflict situations with the student. The user obtains a profile based on Rahim's model connected to specific situations she acted, the style adopted throughout the 5-exchange game session, and advice about which actions would have made her communication more effective. The profile is mainly derived by analyzing the appropriateness of the styles adopted in interaction with the virtual agent within the specific interethnic scenario.

The feedback also allows the user to reflect on the sequence of all the choices made during the scenario and related conflict management styles, highlighting both general and specific aspects of the game interactions and deepening any possible hidden/covert facets of the negotiation process. The player can then decide to play the same scenario as long as she likes, change and verify her choices, try and retry which course of actions would produce the best results in effective conflict management and communication.

### 4.3. Testing

#### 4.3.1. Preliminary Testing

This phase involved 35 participants. The sample consisted of 16 secondary school teachers and 19 teachers in training; 11 were men, and 24 were women, with a combined Mean age of 34.56 years ( $SD = 12.38$ ). The first demo of the SG-ACCORD was presented.

Overall, the experience with the SG-ACCORD game was valued as positive both for the technological and the educational aspects. Indeed, the average rating for each of the questions scored was always over 3 points ("Good"), and 85.6% of the subjects ( $n = 30$ ) answered "Yes" to Question number 9 (i.e., "Would you play this game again with different scenarios and characters?"), thus revealing a general interest in the future adoption of the game. In particular, the information and the profile offered after the game session was considered helpful and valuable in building better student–teacher relations and better decisions to deal with conflicts in real-life situations. This was particularly true among the teachers in training (i.e., Question 5 Secondary school teachers  $M = 3.56$ , Teachers in training  $M = 4.53$ ;  $p = 0.047$ ).

From this point of view, we believe that providing teachers with adequate training to use the online role-playing game may help familiarize them with the virtual tool and boost awareness of its potential and learning value, which would enhance its use.

#### 4.3.2. Testing Phase

Overall, 1,015 people accessed the Moodle; 547 people enrolled in at least one of the courses, and 347 people completed all the questionnaires (64.5% women, age range 20–65 years), with a dropout rate of about 65%.

Specifically referring to the evaluation of the acceptance of the SG, the overall feedback was positive. For example, the majority of respondents rated the usefulness (89.9%), the perceived enjoyment (86.7%), the easiness of use (83.8%), the results demonstrability (87.2%), the voluntariness (78%), the perceived control (74.8%), the output quality (70%), and the relevance (57.1%) of using the SG as satisfactory (strongly agree/agree). About one-half of the participants perceived a good self-efficacy (45.5%) while rating the support from colleagues/organization (48.6%) and the prestige (51.4%) in using SGs as neutral.

Moreover, nearly all the participants felt no anxiety while using the SG (84.9%) and reported a high intention to use the SG in the future (74.4%). These findings provided promising evidence on teachers' willingness to use innovative tools for their training and practice.

Furthermore, the Rahim Organizational Conflict Inventory-II (ROCI-II) [16] was administered twice before and after the overall learning experience.

Findings from *T*-tests (pre-post learning experience) revealed that both the adoption of obliging (pre  $M = 3.45$ ,  $SD = 0.72$ ; post  $M = 2.99$ ,  $SD = 0.78$ ,  $p < 0.001$ ) and avoiding styles (pre  $M = 3.01$ ,  $SD = 1.18$ ; post  $M = 2.70$ ,  $SD = 0.99$ ,  $p < 0.001$ ) was significantly reduced. Therefore, findings suggested an increase in engagement by teachers when dealing with intercultural conflicts within classes.

Overall, the evaluation phase was pivotal for assessing the training efficacy and understanding the propensity of teachers/educators to adopt modern and innovative digital tools, such as serious games, for their learning and eventually for transferring their acquisitions in everyday teaching practice.

#### 5. Limitations and Future Research Directions

Because participation was on a voluntary basis, we can hypothesize that teachers who were more interested in achieving culturally responsive strategies for enhancing their classroom management strategies were more likely to participate in the study; diversely, teachers with highly negative views of school experiences and less open to diversity might be underrepresented. Moreover, we should also consider our results as potentially affected by the risk of social desirability bias. Finally, the ACCORD MOOC and game scenarios were offered online only, potentially limiting the enrolment of those with restricted Internet access and favoring participants familiar with the technology. Nevertheless, given the target population of teachers and educators, who are increasingly accustomed to using Information and Communication Technologies, we consider this limitation could have influenced our results to a small extent. Future studies can consider providing a blended approach to playing game scenarios in face-to-face courses.

Furthermore, the game is designed to be used by teachers and educators as a tool to assess and enhance intercultural and communication competencies. Future research could consider increasing the interactive features of the SG-ACCORD by allowing teachers and students to play and design meaningful scenarios together. This perspective would enable exploring further dimensions deemed important by a social group and may impact communal goal orientation, such as rules of beliefs, norms, and behaviors.

#### 6. Conclusions

The current study validates a methodology of designing agents and effective virtual training scenarios that implements psychological, emotional, and behavioral features to capture fundamental psycho-pedagogical elements and simulate interethnic conflict situations in the school context.

The ACCORD e-platform has been found valuable in supporting teachers in effectively building better student–teacher relations and making better decisions in dealing with

interethnic conflicts. Moreover, the ACCORD game has been considered engaging and realistic. We believe that the ACCORD game can enhance teachers' self-reflection and awareness of personal styles of managing interethnic conflicts [43] by acting out roles, experiencing communication, and using negotiation skills within a virtual environment.

Furthermore, ACCORD represents an educational tool that is easily manageable and accessible. Once teachers have familiarized themselves with it, the tool can be used as a stand-alone resource supported by automatic feedback and debriefing systems. The record of teachers' interactions offered at the end of the game scenario can help teachers to observe the choices they have enacted from a detached perspective and therefore support a more accurate reflection on the dynamics that occurred, the implication of personal actions, as well as of the final decision. We believe in the transformative potential of the game, especially the self-reflection process, often beneficial in dealing with different conflicting situations—self-reflection may lead to implementing different styles of dealing with conflict, thereby enhancing empathy, effective feedback, self-awareness, and mental flexibility.

Involving teachers in designing the context and content of the scenarios and the different features of the virtual agents provides situated learning elements that seem crucial for defining authentic simulation experiences, requiring them to engage in situations inspired by real-life experience. This appears essential for the new knowledge, experience, and understanding to be practiced in the everyday school context.

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