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***Class-Card*: a Role-Playing Simulation of Instructional Experiences for Pre-service Teachers**

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Abstract. This paper introduces to *Class-Card*, a role-playing simulation allowing pre-service teachers to experience a large part of the instructional process, from planning, to post-active phases. The players first have to perform a cognitive analysis of the learning tasks of a lesson, then they are faced with disruptive events they react on, guided by theoretically-sound frameworks. We examined seven pre-service teacher students using *Class-Card* on five simulations. The results show that participants were engaged in rich decisions and verbal interactions about the events they were faced to. We contend that *Class-Card* is a promising way to attenuate the “reality-shock” novice teachers experience and help them build professional knowledge.

Keywords: Role-play simulation; Teacher training; Teacher professional development; Classroom assessment scoring system

1 Introduction

To teach is complex because it implies to make many decisions urgently. So, teachers typically go daily through three intertwined phases [1]: *pre-active*, when they specify learning objectives and content (design phase); *interactive*, when they introduce to the content, manage classroom, and support students’ understanding; *post-active*, when they assess the whole instructional session, students’ learning, and make adjustments for further implementations.

Pre-service teachers usually encounter difficulties to understand and manage these phases [2], as planning is an articulated process linking curriculum and taught knowledge on one hand, and contextual features, like students or classroom context, influencing these phases on the other [3]. Also, pre-service teachers hardly handle interactive decision making, classroom management or feedback-related information because they heavily rely on numerous and complex cues [4].

Even if internships are essential to experience teaching in authentic contexts, they often are difficult to organize, manage, and mentor [5]. Building training devices that

would enable pre-service teachers to simulate simplified yet realistic instructional situations would give them the opportunity to experience useful skills in university settings.

2 Instructional Process and Teacher Training

Teacher education should certainly be strongly anchored in real-life practices. However, training of pedagogical skills should not be entirely left to field experiences or internships as it could lead, for teacher university, to loss of control of rich field-experience material allowing to enhance pre-service teachers' academic learning [6]. Simulations and role-playing have been long used to that end in teacher education [7].

Micro-teaching [8] is an efficient way to simulate instructional events and to train teachers. After a self-record of a short teaching session, the teacher, other peers, and their trainer view the session and make feedback and comments. Also, video-displayed events are used in teacher training in an efficient way [9]. On one side, micro-teaching, as a collective role-play, is highly implicative, but makes students focus on improvised turn-taking rather than deliberate participation. Video-based training, on the other side, requires a large database of events, but may not always be adapted to participants' concerns, since the videos are selected by the trainer. Besides, they also may focus novice teachers on details rather than on more general features [10].

Even if micro-teaching and video-based training put risk-free time constraints on the training, they do not address other professional facets like considering alternate teacher behaviors [11], and ways to collaboratively design them and test their likely effects.

3 Learning Teaching through Role-Play Simulations

The goal of instructional games, role-plays, or simulations is to expose pre-service teachers to situations and help them develop and exercise their decision-making. Games are focused on competition and entertainment, role-plays on fidelity of the players' interactions, whereas simulations are more open-ended situations where some important variables interact [12]. With a large positive overall effect ($g = .85$), simulations are among the most effective means to facilitate learning of complex skills and scaffolding types including feedback and reflection can enhance this effect [13]. The three main features of simulations are the objects or situations they mimic, the tools they use, and their fidelity [14]. Table 1 lists some instructional process simulations.

According to Gredler [12], simulations have to present: (a) an adequate model of the complex real-world situation the participants have to cope with; (b) a defined role, including responsibilities and constraints, for each participant; (c) a rich environment allowing participants to execute strategies; (d) and, feedback for participants' actions. Incorporated in a teacher training simulation, these characteristics enable pre-service teachers to undertake cognitions and behaviors close to those they would be experiencing in real-world teaching contexts.

Table 1. Some simulations of instructional processes.

Simulation	Simulated Objects and Situation	Tool Description	Fidelity
<i>Family Case Simulation</i> [15]	Group discussion on how to help a dysfunctional family	Teachers' cases	Low
<i>Video Card Game</i> [16]	Solving pedagogical problems collaboratively	Bank of short video excerpts to be annotated	Mid
<i>SimSchool</i> [17]	Learners with specific needs behavior simulation	Web-based system	Mid
<i>Cook School District</i> [18]	Simulation of students' engagement and performance	Web-based system	Mid

We designed a study to assess the usefulness, for teacher training, of *Class-Card*, a role-play simulation of the teaching process phases. We address the following research questions: Firstly, can *Class-Card* encompass the different phases of the instructional process? How did the participants tackle with these phases? Did they understand their roles easily? With which role-play flow? Secondly, what information type (e.g., from the lesson plan, the events) do participants process across the simulation? Do the role's and participants' expertise level affect the type of information they use?

4 Method

4.1 *Class-Card* Role-Play Phases

Class-Card is a paper-based role-playing board which simulates the teaching phases (pre-, inter-, and post-action). It is played by three players of whom two are in frontline: The *Teacher* (role taken by a pre-service teacher) and the *Play master* (a pre-service teacher or a teacher trainer depending on the session form, see § 4.3) interact according to *Class-Card*'s lesson plan, see § 4.2, and additional material. The *Discussant* (background function taken by a teacher trainer) initializes the game and manages the discussion. So, a *Class-Card* session has three phases preceded by an initialization phase.

- **Initialization.** The experimenter presents the simulation material and explains the game's purposes, rules, and phases. The *Teacher* reads the Lesson plan (see § 4.2) which is the focus of the Preparation phase.
- **Preparation.** This phase, during which the *Discussant* has the background role of clarifying the rules and note taking for the *Discussion* phase, is composed of two sub-phases. This phase corresponds to teaching's pre-active phase.
 - **Examination.** The *Teacher* analyzes the lesson plan to draw a best mental image of it. Following this analysis, he selects the most appropriate *pupil action cards* [PAC] and *teacher action counters* [TAC] to define, as accurately as possible, respectively pupils' cognitive activity during the lesson sub-sections and how he would concretely implement them. Short notes can be written on sticky notes to detail the situation and help remembering some important points. The result is a sort of a coded lesson shape the *Teacher* has to implement in the simulation phase.
 - **Explanation.** The *Teacher* explains what are the main points of his *Examination* to the *Play master* who can request more details. Then, the *Play master* randomly

picks between 3 or 5 *Disruptive events cards* [DEC] to be used in the next phase during which the *Teacher* can only refer to the coded lesson.

- **Simulation.** During this phase, which represents the interactive teaching phase, the *Teacher* simulates a real-time role-play of the lesson, as if he were in front of pupils. The *Play master* observes and can interrupt, at any moment, with playing one of the DEC's front-side to simulate a situation the *Teacher* has to react spontaneously on. Then, both *Teacher* and *Play master* read its backside, to assess the soundness of *Teacher*'s reaction. The backside's content ensures a form of theory-grounded lesson assessment. This phase is iterated until the lesson plan is fulfilled.
- **Discussion.** During this phase corresponding to teaching's post-action, the *Discussant* manages a debate between *Teacher* and *Play master* who express their feelings or opinions, discuss the decisions, formulate alternative actions, etc., of the preceding *Class-Card* phases. The following questions serve as a framework to the discussion: "Which problems appeared? Which decisions did you make to solve them? Which ones were difficult to solve? What would you modify if you had to perform this session again? What did you learn during the simulation session?".

4.2 Material

Material of *Class-Card* simulation game comprises a lesson plan and the role-playing material described hereafter.

Lesson Plan. The participants get a lesson plan including 6 phases of a French language lesson on adjective agreement (3rd Grade). Its goal is to deeper characterize illustrated monsters in a problem-solving session.

1. *Problem* (5 min). Students read a monster's description to guess which monster picture, among plenty, matches the description.
2. *Work Phase* (10 min). Students improve the monster's description.
3. *Collective Discussion* (10 min). Some students' descriptions are read out loud, insisting on adjectives, to the whole class; students guess which monster matches them.
4. *Synthesis* (15 min). A collective synthesis is produced: adding adjectives specifies more accurately the nominal group; adjectives are a useful description means.
5. *Transfer task* (10 min). The students write a chosen monster's picture description.
6. *Assessment*. The students play a game consisting in matching their portraits and descriptions.

Role-playing material. Alongside the simulation session, theoretically-sound pedagogical information is delivered to scaffold the gameplay. Three kinds of material exist. *Pupil action cards* [PAC] (see Fig. 1a) are selected by the *Teacher* during the preparation phase to define learners' cognitive activity, relying on Bloom et al.'s cognitive taxonomy [19]. *Teacher action counters* [TAC] are taken from Merrill's [20] classification of instructional activities (tell, show, ask, help, supervise) and are selected by the *Teacher* during the preparation phase to define his teaching acts. *Disruptive event cards* [DEC] (see Fig. 1b), which were randomly picked by the *Play master* during the *Teacher*'s explanation, are used during the simulation phase to represent a plausible disruption in the lessons' progression. Their front-side introduce to a disruption, its dimension according to the *Classroom Assessment Scoring System* (CLASS) manual

[21], and a question the *Teachers* has to reflect on. Their back-side present a CLASS-based analytic elaboration, to help ground the soundness of players' assessment decisions and stimulate a reflexive practice, rather than to propose unquestionable tips.

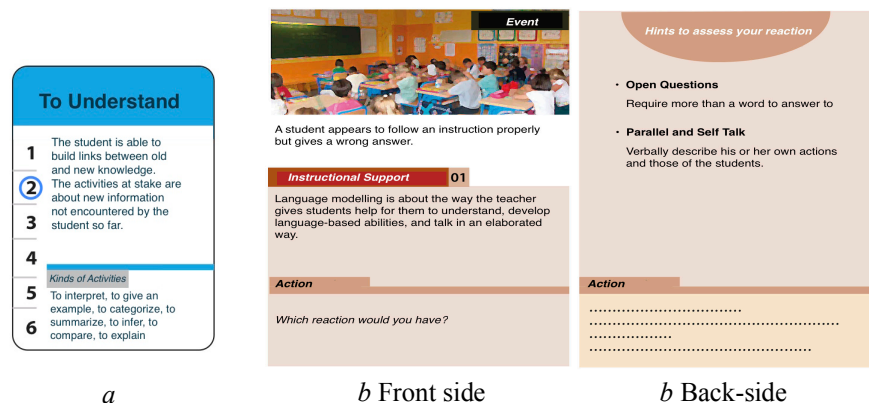


Fig. 1. a: Pupil Action Card **Fig. 1. b:** Disruptive Event Card

4.3 Participants

We recruited 7 participants and 1 teacher trainer (author 2, experimenter) from the Grenoble Teacher Training Institute. They played a *Class-Card* simulation adopting two different forms depending on the roles' distribution among participants (see § 4.1). All the sessions were audio-recorded upon participants' agreement.

Table 2. Basic information on participants.

Sessions	Roles	Degree	Participants work experience as teachers
<i>Teacher trainer-led sessions</i>			
1	Teacher	Undergraduate	Kindergarten
2	Teacher		Kindergarten, elementary
3	Teacher	2 nd -year Master	50+ days kindergarten and elementary
<i>Pre-service teacher-led sessions</i>			
4	Teacher	1 st -year Master	40+ days kindergarten and elementary
	Play master	1 st -year Master	Kindergarten, elementary, and high schools
5	Teacher	1 st -year Master	Kindergarten and elementary
	Play master	1 st -year Master	Kindergarten and elementary

The first form is teacher trainer-led as the experimenter played the role of the *Play master* but also that of *Discussant* during sessions 1, 2 and 3, within which a pre-service teacher took the *Teacher*'s role. The second form is pre-service teacher-led as two pre-service teachers played respectively the *Teacher*'s or the *Play master*'s roles (sessions 4 and 5). Here, the teacher trainer initializes the simulation and discreetly observes the preparation and the simulation phases; for 2 sessions he also took the *Discussant*'s role

to undertake a debriefing of the simulation session. This results in five sessions as shown in Table 2 which also details some participants' basic characteristics.

4.4 Data Collection and Treatment

Each session (duration, about 90 minutes) was audio-recorded and transcribed. To begin, the experimenter introduced the two players to the overall goal of the experiment, and explained the simulation rules, which were handed in print format for further reading (Initialization phase; see § 4.1).

The transcription of the participants' utterances during the simulation sessions was content-analyzed: propositions about similar ideas were counted and ranged in meaningful categories and differentiated by the kind of *Class-Card* material that stimulated its appearance (e.g., lesson plan, pupil action cards and teacher action counters, sticky notes, reaction to disruptive event cards, and its assessment with its backside; see § 4.2). Actions or decisions declared during the lesson's pre-active, interactive and post-active phases were coded and counted using the categories named after *Class-Card* material, and the preparation phase's sticky notes. Actions or decisions independent of *Class-Card*'s stimulation were coded as "built ideas". The discussion was neither processed nor analyzed for paper length purposes.

5 Results

5.1 Qualitative Results: Overall Simulation Activity Flow

Table 3 reports the material types' use frequencies during each session. We note a similar use of the material across session forms ($\chi^2_{(3)} = 2,36; p = 0,50$). However, even if the distribution of the material type adopts a similar shape (more PAC and TAC than sticky notes and reactions to DEC), the teacher trainer-led sessions present about the double of PACs and TACs compared to the pre-service teacher-led ones, which can be an expertise effect. The rest of this section qualitatively analyzes the different phases.

Preparation: Examination sub-phase. Teachers formulated additional examples and remarks about the content; they elicited expected students' answers and productions (e.g., Session 3: "*Why did you eliminate this monster? How did you do?*"). They described actions they might be engaged in (e.g., Session 3: "*The teacher walks from student to student to gather some students' productions to be displayed on the board*").

Preparation: Explanation sub-phase. Teachers mentioned likely students' cognitive activities according to Bloom's taxonomy (e.g., Session 3: "*I gonna ask her some questions to check if she's actually reflecting on the task by herself, instead of simply waiting to me.*"). Thus, they accounted for possible events and facts which were not mentioned in the Lesson plan, sometimes further exploring the consequences of a decision (e.g., Session 2: "*If no student answers 'qualificative adjective', I should give one myself, unless I have to explain it because students have usually to elaborate on that idea.*").

Table 3. *Class-Card* use descriptive data during the whole simulations. Read: During the first session, 15 Pupil Action Cards were used during the examination sub-phase.

Session Form	Teacher trainer-led				Pre-service teacher-led		
	1	2	3	Total	4	5	Total
Pupil Action Card	15	20	10	45	6	11	17
Teacher Action Counter	14	20	13	47	14	9	23
Sticky Notes	2	7	12	21	6	9	15
Reaction to DEC	3	3	5	11	4	3	7

Simulation phase. Two different kinds of elaborations were given. Firstly, before any disruption appearance (DEC), verbalized thoughts were mainly about preparation phase (e.g., Session 3: “*If the monster’s description lacks information, I’m expecting that students make several suggestions. If we realize that we’re lacking answers, then information about monsters may lack*”). Secondly, after a disruption, *Teachers* often focus on novel elaborations from scratch to bring real-world details that would fit the event better. Expectedly, in both cases, they thought syllogically (“*if ... then ...*”), and explored alternatives to actions partly based on the CLASS-based information available on the DEC’s back-sides.

Discussion phase. This phase varied across sessions: some *Teachers* used it to perform a deeper analysis of the simulation session while others used it to reflect on their own activity. Three main points were reviewed: – the degree of likeliness or authenticity of the proposed situation or undertaken actions (e.g., Session 4: “*Just keep in mind that during a lesson nothing goes as planned and we’ve always to adapt to situations... So events make us see exactly how we adapt.*”; Session 3: “*I think our reaction to events during the game is close to those in real-life, we can’t actually turn things in our head, we decide on-the-fly*”); – the relevance of the simulation acts performed during the session (e.g., Session 3: “*I found it more interesting to plan a lesson and simultaneously think about what pupils would do, because I tend to leave this behind*”); – the efficiency of their own player’s role as *Teacher* (e.g., Session 3: “*Just when I was explaining the tasks, I was realizing that they were not so clear*”).

5.2 Quantitative Results: Verbalizations Source References

About the information type used and the effect of role definition and players’ expertise level, Table 4 shows each *Class-Card* phase and the source material originating the players’ discourse to typify the simulated lesson.

Table 4. Verbalizations' sources as percentages of the overall explanation, per phase and play form. Read: In Examination sub-phase, 48.1% of players' talk in the Teacher trainer-led condition referred to the lesson plan.

Source/Phase	Teacher trainer-led	Pre-service teacher-led	Statistical test
<i>Prep.–Examination</i>			
Lesson Plan	48.1	41.1	
PAC & TAC	11.9	9.7	
Built Ideas	40.0	49.3	$\chi^2_{(2)} = 1.74$
Reaction to DEC	–	–	$p = 0.42$
Preparation	–	–	
<i>Prep.–Explanation</i>			
Lesson Plan	24.6	60.1	
PAC & TAC	31.4	15.3	$\chi^2_{(2)} = 25.92$
Built Ideas	44.0	24.6	$p < 0.01$
Reaction to DEC	–	–	
Preparation	–	–	$V_c = 0.36$
<i>Simulation</i>			
Lesson Plan	22.2	25.9	
PAC & TAC	0.8	0.4	$\chi^2_{(4)} = 1.87$
Built Ideas	61.7	63.7	$p = 0.76$
Reaction to DEC	2.6	0.9	
Preparation	12.7	9.1	

Typically, after their lesson plan reading, the *Teacher* engaged in the Examination phase equally referring to Lesson plan or expressing new ideas. Then, during Explanation phase, where a more theory-grounded coding of the lesson was supposed to be stimulated, references to the sources adopted a significant and moderate difference according to the session forms: the focus on lesson plan remained for the pre-service teacher-led form, whereas in Teacher trainer-led sessions PACs and TACs quotations and built ideas formulations were more frequent. So, a sort of expertise ensured that Explanation's talks are closer to *Class-Card*'s underlying objectives.

During Simulation phase, even if the reference to DEC was very low, the CLASS-based back-sides of these cards let participants reflect on the pedagogical consequences of events and reactions to them by expressing a growing amount of Built ideas (about 60%), demonstrating a sort of adaptability by giving novel alternatives as well of a “percolation” of the ideas elicited in the previous phases. PACs and TACs information were not mentioned, while references to the Preparation sub-phases were cited (about 10%). These reflections were in line with the Lesson's objectives as the plan still stays a reference (about 25%). There was no statistical difference according to the session form but, as in previous phase *Play master*'s expertise permitted a closer appropriateness to *Class-Card* design objectives, the distance of the Built ideas to theory-based and effective pedagogy should be examined.

6 Discussion

Class-Card is designed to simulate, at small cost, the teaching phases to permit pre-service teachers' engagement and adaptation in a reflective analysis of their upcoming daily activities – planning (pre-active), teaching (interactive), and assessing their instruction (post-active). *Class-Card* creatively enhances the grounding of a two-fold process: the *coding* and *reflective analysis* of instruction based on theoretically-sound material (Bloom's pupil cognitive activities, Merrill's teacher activities, CLASS-based events and teaching classification). This material is pedagogically agnostic and allows the coding of a large diversity of lessons. Results show *Class-Card*'s successful design as it ensures an understanding of a shared vocabulary and an increasing verbalization of alternative teaching acts as many novel ideas were built during its simulation phase.

More specifically, the Preparation phase enabled the *Teacher* to make strong connections between teaching and learning, in precisely defining both his actions by lesson coding, and students' cognitive activities during teaching. This permitted pre-service teachers to surpass possible self-centered concerns. Simulation phase let the *Teacher* act according to his planning and improvise when facing prototypical disruption. The *Teacher*'s reflection was enriched by CLASS dimensions and fostered explanations of pupil behavior and their likely causes, and of *Teacher*'s own reactions' nature and degree of effectiveness. However, this game is most efficient if the *Play Master* has a certain pedagogical expertise to scaffold players' thoughts, notably in the Explanation sub-phase. Unfortunately, it was impossible to examine precisely the effect of this expertise in the discussion phases on talk quality as results present material use frequencies and not the theory or meta-analysis basement of players' talk.

This explorative study has two limitations. The amount of sessions is low and the roles' distribution across sessions is unequal. *Class-Card* simulation's rules are complex and need a time-consuming understanding effort. This leads to the suggestion of next research perspectives: increase the sample's size, equally balance participants among the experimental groups, develop cards and counters relying on meta-analytic results on teacher effectiveness, refine the talks' categorization system (adding a dichotomized category: meta-analysis or theory-based). We also plan to measure the effect of multiple *Class-Card* sessions involving multiple lesson plans, likely built from scratch, about various content and/or disciplines, on pre-service teacher's reflective analysis of his own teaching practice during internships. This would allow to gauge its consequences on the "reality shock" novice teachers often experience [22].

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