A review about role-play simulations of decision-making: the case of political science teaching and learning

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1. Introduction

Educational expertise with regard to simulation-based learning environments is being valued because simulations are considered to be rich, authentic learning environments that narrow the gap between education and work (Breckwoldt, Gruber, & Wittman, 2014; Ellington, Gordon, & Fowlie, 1998; Tynjälä, 2008). Role-play simulations are a specific type of simulation that is well used in higher education learning contexts. They refer to non-computer-based simulations in which participants incorporate the role of a specific actor in a predefined situation while following a set of rules and interacting with others (Lean, Moizer, Towler, & Abbey, 2006). Such simulations are also implemented in the specific learning context of political science, in which students are assigned roles within socio-political processes and expected to act as real political actors; for example simulating a city council, a national government, a body of the European Union (EU) or United Nations (UN) (Boyer & Smith, 2015).

Role-play simulations of political decision-making provide an experiential learning experience predominantly introducing students to issues that are difficult to tackle in any other way, such as the complexity of multilevel decision-making processes, the number of interests that may be at stake during these processes, and the application of accompanied diplomatic skills. Over the past decades, they have grown to be considered as valuable learning environments that are highly appreciated by students and lecturers (Giovanello, Kirk, & Kromer, 2013; Guetzkow, Alger, Brody, Noel, & Snyder, 1963) because, so far, they have been known to be related to domain-specific skills, such as political efficacy (e.g., Mariani & Glenn, 2014), but also to more generic skills, such as oral communication skills (e.g., Obendorf & Randerson, 2013).

In general, there has been an emergence of more outlets for work on pedagogy within the discipline (Boyer & Smith, 2015) which represents an increased interest in evidence-based

teaching and related aspiration to develop educational expertise, i.e. increased insights about what learning outcomes are fostered for which students under what conditions. The field has been struggling to capture learning outcomes of role-play simulations of political decision-making (Duchatelet, Bursens, Donche, Gijbels, & Spooren, 2017). These struggles have mainly been approached as issues of research design and operationalization. Baranowski and Weir (2015) conclude their review with a call for more methodological rigour that should result in more systematically reporting about sample sizes, applying more pre- and post-measurement designs, and more quasi-experimental research designs (including control groups) to investigate simulation's effectiveness. To date, the contribution of educational sciences to this field has been scant although it is needed to develop more validated design methods and to generate simulation's best impact (O'Neil, Baker, & Perez, 2016).

Aiming for increased expertise in how simulations foster which learning outcomes, one important aspect that has systematically been overlooked are simulation's contextual features, such as background of participating students, context and topic of the simulation, how the simulation is embedded in the broader teaching context, what characterises the process of the simulation etc. Such influences should not be underestimated when probing into student learning processes and outcomes (Biggs, 1985; Dinsmore & Alexander, 2012). As such, the field would benefit from a more detailed and comprehensive approach that takes contextual variation into account when investigating how these simulation-based learning environments exactly foster which student learning. To this aim, this review first wants to *define* how learning environment components and learning outcomes of currently used role-play simulations of political decision-making vary in their broadest sense. Further, this review also wants to look into patterns that might *connect* reported simulation contextual features to reported learning outcomes. Finally, in order to advance the research field, this review provides a typology that *evaluates* which contextual features already have been taken into account in current simulation effect research.

As role-play simulations of decision-making are a very specific type of learning environment, the following part first clarifies what exactly characterises them and how they can be distinguished from related phenomena. Further, a comprehensive model that has its roots in educational and workplace-related learning contexts is presented, which guides this narrative review with systematic search to answer the following research questions:
RQ 1 Which learning environment components and learning outcomes of role-play simulations of political decision-making can be uncovered?

RQ 2 Which patterns can be detected between reported simulation's learning environment components and reported learning outcomes?

RQ 3 Which learning environment components already have been taken into account when investigating simulation's effect on student learning outcomes?

2. Theoretical background

2.1 Role-play simulations of decision-making

Simulations are generally grouped into two broad categories: "(1) simulations in the sciences and engineering that are used to experiment and test hypotheses, and (2) training simulations that offer environments that simplify reality and allow learning without risks inherent in certain "live" situations" (Sauvé et al., 2010, pp.7). Role-play simulations of decision-making belong to the second group of simulations. First, we distinguish role-play simulations from other related phenomena, also drawing attention to characteristics of simulations in general. Finally, we elaborate a bit more on what the discipline of political science specifically adds to the simulation-context.

2.1.1 Distinguishing role-play simulations from related phenomena.

The most important feature of all simulations is that they should be based on the imitation of a system or situation (Guetzkow et al., 1963; Landriscina, 2013; Sauvé et al., 2010). Each simulation should have a certain degree of *verisimilitude,* which implies that the simulation is a valid representation of reality in a structured but simplified way (Ellington et al., 1998; Sauvé et al., 2010; Wright-Maley, 2015). Additionally, role-play simulations are characterised by participants incorporating the role of a specific actor in a particular situation (Lean et al., 2006). In general, each simulation should be characterised by *dynamism* and *outcome variability* (Ellington et al., 1998; Guetzkow et al., 1963; Sauvé et al., 2010). In the case of role-play simulations of decision-making, the process and outcome should thus vary from iteration to iteration, even when the same students have participated in the same simulation more than once (Asal, Raymond, & Usherwood, 2015).

Simulation's dynamism is considered to be a product of a certain degree of *human agency* combined with the *structure* provided by the simulation environment (Chin et al., 2009; Wright-Maley, 2015). *Human agency* refers to the choices that participants make within the simulation's boundaries. Participants' agency and decision range are bound to opportunities and constraints provided by the various elements of the simulation environment

(Chin et al., 2009; Leigh & Spindler, 2004; Wright-Maley, 2015). *Structure* refers to the simulation environment in which participants operate (Chin et al., 2009). Role-play simulations do not put very high demands on the simulation structure. To enable dynamism it is usually sufficient to include reality-based procedures or rules (e.g., voting rules) and let the actors act out their roles. For example, during a European Union role-play simulation of decision-making about asylum policy (particular situation) foreign affairs ministers (roles) can use several negotiating strategies trying to influence the outcome (agency) but in the end the voting has to be done by qualified majority (structure).

Implementing reality-based features makes role-play simulations different from less structured role-plays in which participants act from prescribed roles (e.g., Korean War; Krebs, 2009). Compared to simulation outcomes, game outcomes are considered to be less dynamic and more quantifiable as human agency is restricted by implementing rules or procedures (e.g., Prisoner's dilemma; Asal, 2005; Ellington et al., 1998; Wright-Maley, 2015). Including dynamism in simulation-games often results in more complexly structured designs that are computer-based (e.g., leadership simulation-games (Aldrich, 2003); flight simulations (Hays, Jacobs, Prince, & Salas, 1992)).

Figure 1 depicts one way to visualise how related phenomena of simulations, role-plays and games can be distinguished. It is important to take into account that they are not easy to differentiate from each other. They can appear in their 'pure' form but also in many varying blended forms. The distinction between role-plays, games and simulations should therefore be considered as a continuum rather than as complete separate categories (Wright-Maley, 2015). Also, in general, more structure inherently includes less human agency. However, when distinguishing simulations from related phenomena, the balance between structure and agency always should be interpreted in the light of less or more verisimilitude. For example, in flight simulations a highly structured environment fosters a high degree of human agency, which resembles a full range of 'real-life' options driving participant's decision-making and results in a high degree of dynamism and outcome variability.

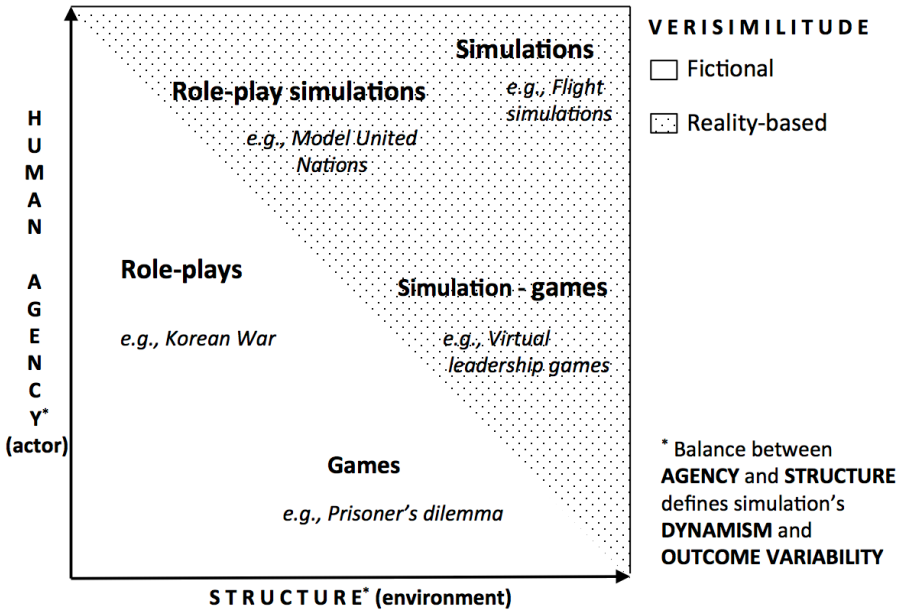

Fig. 1. Distinction between Simulations, Games, and Role-plays

2.1.2 Political science and role-play simulations of decision-making.

The discipline of political science studies decisions that are taken in a societal context and that are binding for members of that society. With regard to decision-making processes, political decisions are taken in the stages of agenda setting, policy formulation, policy adoption, implementation and evaluation (Lasswell's policy cycle; Laswell, 1956). During the entire policy-making cycle, public actors as well as private actors are involved. Public actors are the legitimate actors who belong to public institutions and who take political decisions based on the rules and procedures that are stipulated in constitutions and treaties. Private actors are non-governmental organizations and interest groups that are continuously lobbying and influencing the final outcome of the political decision. Also media can be considered as relevant private actors (Bursens, Gijbels, Donche, Spooren, 2018). During role-play simulations of decision-making students are assigned roles within those socio-political processes and expected to act as real political actors (Boyer & Smith, 2015).

Within political science, three main study domains can be distinguished: political theory (dealing with theoretical and conceptual questions), comparative politics (CP, dealing with empirical questions, mainly at the level of and within states) and international relations (IR, dealing with relationships between states) (Bursens et al., 2018). Role-play simulations of decision-making are well established in courses of comparative politics (including American Government courses) and international relations (Baranowksi & Weir, 2015). More recently, the use of such simulations has also emerged within the field of European studies (Brunazzo

& Settembri, 2015). In general, three types of simulations can be distinguished: course-embedded (credit-bearing for all participants), extra-curricular (non credit-bearing for all participants), or hybrid (mixed; for some participants credit-bearing and for others non credit-bearing) (Taylor, 2013).

2.2 Mapping simulation-based learning environments and their outcomes

Simulations are known for providing virtual environments that facilitate realistic experiential learning and allow participants to practice and integrate their knowledge, skills and attitudes. These safe authentic environments include realistic conditions such as environmental distractions, stress, and time pressure (Aldrich, 2006; Beaubien & Baker, 2004; O'Neil et al., 2016). Because of these features simulations provide learning environments that are closely related to the workplace (Breckwoldt et al., 2014; Ellington et al., 1998; Tynjälä, 2008). Similar to workplace learning, a simulation creates the possibility for learning but it is how the students participate and interact during the simulation that is central to their learning (Tynjälä, 2008). Consequently, capturing student learning within simulation-based learning contexts should rely on educational as well as workplace learning expertise. Therefore, we introduce the MISTER-model as a conceptual framework: a **M**odel for **I**nvestigating **S**imulation-based **T**eaching **E**nvironments and their **R**esults (Fig. 2). This model combines insights from Bigg's model of learning, also known as the 3P-model (Biggs, 1985), and from Tynjälä's model for workplace learning, which is based on Biggs' 3P-model (Tynjälä, 2013).

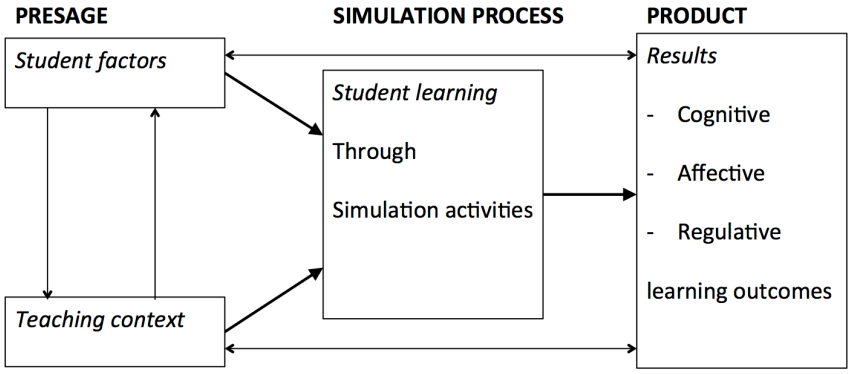

Fig. 2. MISTER-model: **M**odel for **I**nvestigating **S**imulation-based **T**eaching **E**nvironments and their **R**esults (modified from Biggs, 1985; and Tynjälä, 2013).

Similar to the 3P-model (Figure 2), our MISTER-model distinguishes between presage, process and product factors. As we are focusing on simulations within educational contexts,

similar to Biggs' model of learning (1985), *presage* factors include student factors, e.g., prior knowledge or motivation, and teaching context factors. The latter includes features of simulation design and of all educational activities related to the simulation experience. Pre-simulation activities could include setting learning objectives that refer to desirable outcomes to be achieved by participants (O'Neil et al., 2016). Also, participants could be prepared for the simulation in a specific way (e.g., reading, research etc.). Post-simulation activities could include debriefing, which refers to sharing of and reflecting on simulation experiences to turn these into learning. It is considered as important for learning because deeper lessons are drawn during a debriefing session (Crookall, 2010). Also, assessment could be a post-simulation activity that evaluates the simulation, either from a formative (evaluating goals in order to improve e.g., design, learning process) or summative (evaluating learning outcomes) nature (O'Neil et al., 2016). The *simulation process* component refers to learning during the simulation. As simulations inherently include reality-based features learning processes should be similar to workplace learning, characterised not only by performing in it but also defined by collaboration and interacting with other participants during the simulation. As such, learning processes can be defined by different simulation activities through which learning processes take place (Tynjälä, 2008). Similar to workplace learning, such activities may include participating in the simulation, reflecting on one's contribution, collaborating and interacting with other participants during the simulation (e.g., Tynjälä, 2008). The *product*, which Biggs (1985) defines as the results of the learning process, relates to educational learning outcomes. Three learning outcomes are commonly accepted: cognitive (e.g., knowledge, understanding, skills), affective (e.g., motivation, interest, self-efficacy, engagement) and regulative (e.g., self-reflection, self-regulation) (Pintrich, 1994; Vermunt & Vermetten, 2004).

3. Method

To answer the following research questions: 'Which learning environmental components and learning outcomes of role-play simulations of political decision-making can be uncovered?' (RQ 1), 'Which patterns can be detected between reported simulation's contextual features and reported learning outcomes?' (RQ 2) and 'Which learning environment components already have been taken into account when investigating simulation's effect on student learning outcomes?' (RQ 3), we conduct a narrative review

with systematic search, of which the systematic search, literature selection, and procedure and analyses is further elaborated below.

3.1 Literature search

A literature search in the electronic databases Social Sciences Citation Index (SSCI) and ERIC (Ebsco) was carried out to identify relevant peer reviewed journal articles. In current research, the term 'simulation' is frequently interchanged with others such as role-play and games. A thesaurus search resulted in the use of the following keywords: 'simulation', 'role-playing', and 'educational games'. As role-play simulations of decision-making are primarily used in comparative politics and international relations each of the keywords was separately combined with 'international relations', 'politics', and 'political science'. Over the past decades the use of such simulations has also specifically emerged within the field of European studies (Brunazzo & Settembri, 2015), which is why each of the keywords were also separately combined with 'European studies'. The searches covered the years 1970-2016 in both databases. The final outcomes were as follows: SSCI 1695 references and ERIC 461 references. After removing doubles, 1722 unique references were subjected to initial review. An overview of the results of the literature search is given in Table 1.

Table 1

Overview of literature search

Search terms	SSCI	ERIC (Ebsco)
Simulation & international relations	121	70
Simulation & politics	258	88
Simulation & political science	140	126
Simulation & European studies	466	3
Role-playing & international relations	91	24
Role-playing & politics	365	38
Role-playing & political science	60	50
Role-playing & European studies	156	1
Educational games & international relations	6	15
Educational games & politics	17	28
Educational games & political science	5	17
Educational games & European studies	10	1
Total	**1695**	**461**
Overall total		***2156***

3.2 Selection

To include studies in the synthesis relevant to the review questions, a specific set of inclusion criteria was used. Table 2 visualises the selection procedure using the PRISMA flow diagram (Moher, Liberati, Tetzlaff, Altman, & Group, 2009). The first author screened all journal articles on three categories of criteria: general criteria, simulation features and simulation content. With regard to the general criteria, studies were included when (a) applied in *higher education*, (b) published in *peer-reviewed* journals, and (c) published in *English*.

As this review focuses specifically on role-play simulations, studies were included when (d) focusing on *role-play simulations*, in which participants act out their roles either as unitary actors or as teams. Studies including educational games in which students play 'themselves' were excluded (e.g., Asal, Sin, Fahrenkopf, & She, 2014). Included studies needed to (e) feature *verisimilitude* by simulating real-world contexts (setting, organisation, actor), real-world processes (policy area, decision-making process) or both. Role-plays or games that could not be considered as simulations because they include a combination of fictional countries and non-realistic processes were excluded (e.g., Dingli, Khalfey, Leston-Bandeira, 2013). Selected simulations also needed to (f) include *human agency,* which for this review is defined by face-to-face contact, and only peripheral computer use (when applicable). Because of their very different contextual features simulations that are mainly computer-based or mostly take place online were excluded (e.g., Lay & Smarick, 2006; Raymond, 2010).

Focusing on role-play simulations of decision-making within the discipline of political science, articles were included when simulation content is (g) focusing on *decision-making processes* of public policy including permanently established political settings. Simulations including historical enactments, election processes, or negotiations not directly leading to public policy were excluded (e.g., Coffey, Miller, & Feuerstein, 2011; Gorton & Havercroft, 2012; Nance, Suder, & Hall, 2016). Finally, studies needed to (i) report about student *learning outcomes*. Studies including purely anecdotal content, vague opinions or focusing solely on perceptions about the simulation environment without reporting effects on student learning were omitted (e.g., Brunazzo & Settembri, 2015; Giovanello et al., 2013).

The selection was conducted in several steps. In each step, all studies that clearly did not meet one of the inclusion criteria were excluded. When in doubt about a study, the reference was retained until the next step. Peer-debriefing sessions with all authors involved in this study, discussing the appropriateness with regard to the inclusion criteria, confirmed or

rejected inclusion of studies. After conducting all steps, the final selection consisted of thirty-six primary studies.

Table 2

Selection procedure using the PRISMA 2009 Flow Diagram (Moher et al., 2009)

Identification	Records identified through database searching: 1. SSCI (n = 1695) 2. ERIC (n = 461)
	Records after duplicates removed: n = 1722
Screening	Records screened on title and abstract: n = 1722
	Records excluded: n = 1529
Eligibility	Full text articles assessed for eligibility: n = 193
	1. General criteria 2. Simulation features 3. Simulation content
	Records excluded with reasons: n = 157
Inclusion	Studies included in content analysis: *N* = 36

3.3 Procedure and analysis

Next to the previously described systematic search, this review uses a narrative approach to analyse literature. Providing the opportunity to reveal in-depth information a narrative review is suitable to highlight a holistic understanding of a phenomenon (Pawson, 2002), in this case the learning environment of role-play simulations of decision-making. We apply the MISTER-model as an analytical framework to descriptive-analytically examine studies (Pawson, 2002). As our research questions require in-depth exploration, articles were read and re-read in a first step to get to know their content thoroughly. Second, relevant paragraphs were categorized using the method of content analysis with NVivo. Coding was both deductive and inductive. Deductive coding followed components of the MISTER-model: student factors, teaching context (including simulation design), simulation process, and learning outcomes. Within these codes, paragraphs were further labeled with a code in an inductive way, which allowed detailed mapping of included role-play simulations of decision-making (Appendix A). In a third step, categories were analyzed beyond the individual studies in order to integrate the different findings and specifying content of the different MISTER-model components (RQ 1). Fourth, various queries were conducted to detect patterns in which different MISTER-model elements connect to reported learning outcomes (RQ 2). In a fifth and final step, a cross-case analysis resulted in a typology of published research (RQ 3).

4. Results

Thirty-six studies met the inclusion criteria for content analysis. After describing sample characteristics, we apply the MISTER-model and probe into the variation of learning environment components and learning outcomes (RQ 1). Further, we elaborate on which patterns can be detected between reported simulation's contextual features and reported learning outcomes (RQ 2). Finally, we present a typology of published research. Based on the MISTER-model, this typology shows which learning environment components already have been taken into account when investigating learning outcomes (RQ 3).

4.1 Sample descriptive

The selected studies encompass research conducted between 1974 and 2016. Most studies focus on simulations within US higher education learning contexts (81%). Three studies refer to a mixed student sample of European and US students (8%). Only four studies relate to European higher education learning contexts (11%), which weren't present until after 2010. While twenty-six studies make use of role-play simulations of decision-making within undergraduate level courses (72%), six studies report about a simulation with mixed level students (17%), and only one article includes a graduate course simulation (3%). Two articles do not clarify the educational level of participating students (6%). The number of publications that report on effects of simulations clearly increases over the past decades, as depicted in Table 3.

Table 3

Overview of articles over time (N_{total} =36)

	Course-elements (C)	Post	Pre + post	C + post	C + pre + post
1970 – 1979		(n = 1) Bertsch & Feste (1974)			
1980 – 1989			(n = 2) Foster et al. (1980) Hazleton & Mahurin (1986)**°		
1990 – 1999				(n = 2) Chernotsky (1990) Lowry (1999)□	
2000 – 2009	(n = 3) Frederking (2005) Rackaway & Goertzen (2008)°	(n = 2) Ripley et al. (2009)□ Zaino &	(n = 2) Bernstein (2008) Jones (2008)**°	(n = 3) Andanova & Mendoza-Castro (2008)	(n = 1) Baranowski (2006)

	Wallin (2005)[°°]	Mulligan (2009)[°]		Ciliotta-Rubery & Levy (2000) Galatas (2006)	
2010 – 2016	(n = 8) Crossley-Frolick (2010) Levintova & Mueller (2015) Mathews & LaTronica-Herb (2013) Obendorf & Randerson (2013)[*] Rinfret (2012) Sands & Shelton (2010) Taylor (2011)	(n = 1) Baranowski & Weir (2010)	(n = 5) Biziouras (2013) Cowley & Stuart (2015)[*] Jones & Bursens (2015)[**°] Mariani & Glenn (2014) Rünz (2015)[*°]	(n = 4) DiCicco (2014) Kalaf-Hughes & Mills (2016) Osgood et al. (2012) Rinfret & Pautz (2015)	(n = 3) Elias (2014)[*] Jozwiak (2013) Levintova et al. (2011)

Course-elements - those observations and assignments directly related to the course (C), Post – post-test, Pre – pre-test; [*] European sample; [**] Mixed sample; [°] Mixed student level; [°°] Graduate student level; □ No student level reported

All studies refer to empirical data collection using course elements, pre-test, post-test or a combined research design. Course-elements include those observations and assignments directly related to the course such as student feedback, reflection papers, and exam grades. During the nineties the first effort for data triangulation emerges when combining the use of course-elements with a post-measurement. After that time research methods become scattered. Over the years, there is no clear trend towards one specific measurement design. Even during the last decade, over one third of the studies solely reports about the analysis of course-elements and does not triangulate their research findings. Overall, these findings show inconsistency in operationalization and represent the struggle researchers seem to experience when capturing simulation's learning outcomes, an issue that has already been addressed by Baranowski and Weir (2015).

4.2 Which learning environment components and learning outcomes of role-play simulations of political decision-making can be uncovered?

To answer this research question (RQ 1), each Mister-model component is separately explored in depth, elaborating on its featured elements. First, variation in reported learning outcomes is described. Second, variation in other MISTER-model components is consecutively reported: student factors, teaching context, and simulation process. An exhaustive overview of all MISTER-model features for each of the selected articles is provided in Appendix A.

4.2.1 Learning outcomes

With regard to reported learning outcomes, four groups of articles can be distinguished. The first type of articles only reports about *cognitive learning outcomes*. This type contains two groups of which the largest group of articles (n = 12) solely refers to outcomes related to students' knowledge and understanding, while another smaller group (n = 5) additionally includes certain skills that are being fostered. Outcomes of knowledge and understanding are related to theoretical concepts, decision-making processes, policy fields, or citizenship. Most of the reported skills can be defined as generic skills: research, writing, negotiating, oral communication, collaborating, analytical-critical thinking, and problem solving. Few studies report about domain-specific political skills. A second type of articles (n = 16) additionally reports about *affective learning outcomes.* Most of these articles refer to motivational aspects as outcomes of the simulation, which have been reported as motivation, interest, or engagement. Some affective learning outcomes relate to students' self-belief, such as confidence and political efficacy. The third type of articles (n = 1) combines cognitive learning outcomes with *regulative learning outcomes*. Only the article of Galatas (2006) complies with this category. Regulative learning outcomes relate to student's self-directing behaviour during the simulation, or students expressing intended behavioural change after the simulation when reflecting on their preparation and actual participation in the simulation. The fourth group (n = 2) includes two articles that report about all learning outcomes: cognitive, affective, and regulative. A detailed overview of all articles and reported learning outcomes can be found in Appendix B.

4.2.2 Student factors

All studies (n = 36) mention one or several student *demographics*, such as age, gender, race, nationality, or student level. Students' study domains vary from political science related domains (e.g., international relations) to substantially different disciplines (e.g., biology). Only few studies (n = 9) refer to other student characteristics such as *prior experience* (including prior knowledge), *motivational aspects* or *beliefs*, either self-belief or beliefs about simulation efficacy.

4.2.3 Teaching context

The component of teaching context can be divided in the elements of simulation design and broader teaching context. Consecutively, we discuss these in a comprehensive way.

Simulation design. With regard to simulation design we can distinguish features of context, setting, type, size, and duration. Simulations are particularly used in the *context* of comparative politics (n = 20), followed by international relations (n = 8) and European studies (n = 7). Considering the simulated *setting*, some studies apply simulations in contexts of multilevel politics (e.g., United Nations, European Union) (n = 13) while others focus specifically on US politics (e.g., US Congress, National Security Council) (n = 15). Only a small number of studies (n = 7) focuses on politics on another than US-national level (e.g., British Parliament) or on urban level (e.g., city council). Most simulations (n = 29) are of the course-embedded *type*. Simulations come in various *sizes* from as little as a group of 12 students to including over 300 participants. The majority of the simulations (n = 17) are created for small groups (15-35 students). Simulations also vary in *duration* from lasting one class time (n = 5), being spread over several classes (n = 18), lasting one day (n = 4) to taking up several days (n = 5). Not all studies describe previously mentioned simulation features. For example, eleven articles lack information about size or duration of the simulation.

Broader teaching context. The following elements could be distinguished with regard to the broader teaching context: objectives, preparation, role assignment, debriefing, and assessment. Most of the articles (n = 33) describe specific simulation *objectives*, however, the degree of how explicitly these are addressed varies. Similar to the previously described cognitive and affective learning outcomes, four categories of objectives can be distinguished: knowledge and understanding, skills, self-belief and motivational aspects. Regarding simulation *preparation* the following activities can be distinguished: meetings, research, writing, presenting. Studies combine these in several ways, of which most (n = 29) refer to a combination of preparation activities. Meetings (n = 31) are most frequently reported and often involve knowledge sharing. It is noteworthy that two articles explicitly include the attendance of a 'real-life' local government meeting, which they consider as helpful for students to visualise their role for the simulation. Research activities (n = 27) often include reading assignments, more or less self-directed by students. Writing assignments (n = 23) are always related to student's role, such as position or strategy papers, and always combined with other preparation activities. Some articles (n = 5) add presentations to the preparation program, either individually or collaboratively. Considering that role-play is a specific feature of role-play simulations of decision-making, a substantive amount of studies (n = 22) elaborates on the feature of *role assignment*. Four approaches can be distinguished on a continuum from random role assignment (n = 5) to an elaborated selection procedure (n =2).

In between these extremes sometimes students' preferences are taken into account (n = 7), or roles are assigned based on student characteristics such as engagement, academic success, or personality (n = 8). The *debriefing* phase includes written assignments (n = 7), oral discussion and reflection (n = 11), or both (n = 10). Studies differ in the scheduling of the debriefing session: either immediately after the simulation has ended or in a follow-up meeting. Although debriefing is considered an essential element when implementing simulations, not all studies report about its content. With regard to evaluating learning outcomes, summative *assessment*, we distinguish the evaluation of pre-simulation assignments (e.g., strategy paper) (n = 11), the simulation performance (n = 14), and post-simulation assignments (e.g., reflection paper) (n = 9). Less than half of the studies report about how they assess, of which most of them use a combined assessment (n = 14).

4.2.4 Simulation process

Analysing studies with regard to the simulation process results in three definable elements. First, the simulation process is characterised by the *simulation program* that includes formal and/or informal activities. All simulations include a formal program, however, studies differ in how they elaborate on this part of the simulation process. Some simulations (n = 17) also describe an informal program, which is characterized by unmoderated caucuses (format where delegates circulate around the conference room and engage in one-on-one, or small group conversations with fellow delegates; Ripley et al., 2009), outside of class meetings, or even social activities, such as city tours or dinner parties. A second feature of the simulation process to consider is the amount of *teacher involvemen*t. Most studies describe the teacher role as a mediating role, which is not to interfere but to keep the simulation on track. This is achieved by participating in the simulation (n = 9) or by semi-involvement (n = 10). When participating in the simulation, teachers assume the role of president, conference chair, or conference secretariat. When being semi-involved, instructors are available for answering questions concerning procedures, providing feedback, or initiating reflection. Few simulations (n = 2) are completely student-led. In such cases teachers (when available) only interfere in situations of severe conflicts or deadlocks and are rather considered as absent. A final feature of the simulation process is the *played role*. A minority of studies (n = 3) distinguishes between power and non-power roles, also described as more or less leadership roles.

4.2.5 Comprehensive overview

A synthesis of all MISTER-model components is depicted in Figure 3. Results show substantial variation between studies in what has been reported (Appendix A) and also in their specific learning environment features that define and embed the role-play simulation activity (Figure 3).

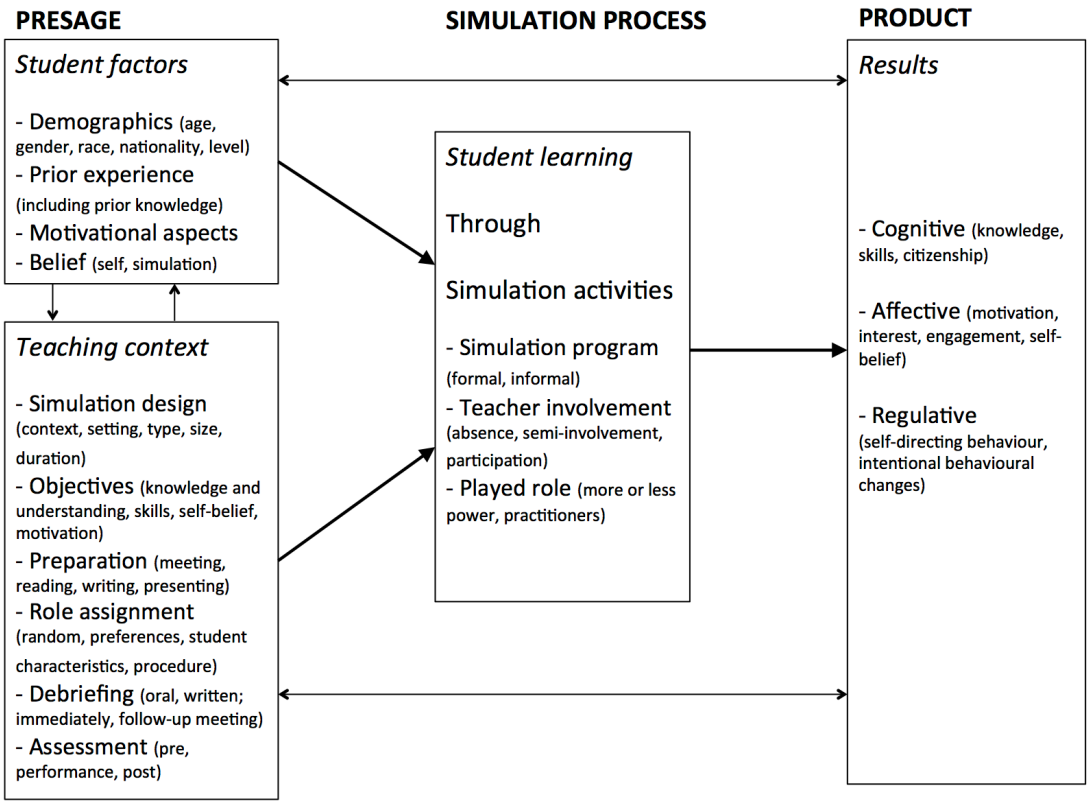

Fig. 3. Comprehensive overview of Learning Environment Components following the MISTER-model.

4.3 Which patterns can be detected between reported simulation's learning environment components and reported learning outcomes?

To answer this research question (RQ 2), several queries were conducted of which the results are reported in Appendix C. In the following detected patterns between MISTER-model elements and reported learning outcomes our described.

4.3.1 Student factors

Analysing the pattern between student factors and reported learning outcomes results in a scattered pattern. Remarkably, studies that report about affective student characteristics, such as motivational aspects, do not necessarily report about affective learning outcomes.

4.3.2 Teaching context

When taking *simulation design* into account, studies reporting about solely cognitive learning outcomes or combining these with affective learning outcomes vary substantially in simulation design. Notably, studies that address regulative learning outcomes all include simulations that are spread over time into several classes or several days.

With regard to the *broader teaching context,* some articles assess simulation's learning outcomes without mentioning these as previously set learning objectives while other studies define learning objectives that are eventually not evaluated. So far, it seems the variation in learning outcomes exceeds the initially set learning objectives, which points to the richness of such learning environments that might foster more learning outcomes than initially thought of. With regard to preparation, studies including one single preparatory activity show less variation in learning outcomes than studies applying a combination of preparatory activities. Notably, studies that report about knowledge and understanding learning outcomes almost always include meetings in their preparation. This could confound measuring the impact of the simulation on knowledge and understanding outcomes, as meetings are primarily used for knowledge sharing. With regard to role assignment, debriefing and (summative) assessment, no trend with reported learning outcomes could be detected.

Overall, the broader teaching context varies as much as its specific simulation design. Each teaching context consists of an almost unique combination of features and elucidates various combinations of learning outcomes.

4.3.3 Simulation process

With regard to the co-occurrence of *simulation process* elements with learning outcomes, it seems that studies that include simulations with informal programs report substantially more about different learning outcomes. Each type of teacher involvement co-occurs with various learning outcomes. Notably, only those studies in which teacher involvement is absent structurally report about more than only cognitive learning outcomes. All studies that report about power and non-power roles solely report about outcomes of knowledge and understanding.

4.4 Typology of published research

No clear patterns could be detected between the various MISTER-model elements and reported learning outcomes. This points to a considerable variation in design that descriptively shows no consistent relation with reported learning outcomes. Question now is

to what extent current research already has taken learning environment characteristics into account when investigating the impact of role-play simulations of decision-making on student learning outcomes (RQ 3). The following typology is based on an evaluation of current research through the MISTER-model lens (Table 4).

Table 4

Typology of published research

Typology of published research		
SINGLE: Learning outcomes as main and only issue		
Andanova & Mendoza-Castro (2008)		Mathews & LaTronica-Herb (2013)
Bertsch & Feste (1974)		Obendorf & Randerson (2013)
Ciliotta-Rubery & Levy (2000)		Rackaway & Goertzen (2008)
Cowley & Stuart (2015)		Rinfret (2012)
Crossley-Frolick (2010)		Rinfret & Pautz (2015)
DiCicco (2014)		Ripley et al. (2009)
Elias (2014)		Sands & Shelton (2010)
Galatas (2006)		Taylor (2011)
Jozwiak (2013)		Wallin (2005)
Lowry (1999)		Zaino & Mulligan (2009)
DOUBLE: Considering one component in relation to learning outcomes*		
Student characteristics		
Bernstein (2008)	Demographics	*Race, gender*
Foster et al. (1980)	Demographics	*Major*
Jones (2008)	Demographics	*EU/US, student level*
Jones & Bursens (2015)	Demographics	*Student level*
Levintova et al. (2011)	Demographics	*Gender*
Mariani & Glenn (2014)	Prior experience	*Political internship or job experience*
Osgood et al. (2012)	Demographics	Major
Broader teaching context		
Biziouras (2013)	Preparation	*Reading content*
Frederking (2005)	YES/NO simulation group	*YES/NO simulation group*
Hazleton & Mahurin (1986)	Preparation	*Preparation time*
Simulation process		
Baranowski & Weir (2010)	Played role	*Low vs high power, Minority vs majority party*
Chernotsky (1990)	Played role	*Primary vs secondary actors*
MASTER: Mastering multiple components in relation to learning outcomes*		
Student characteristics + broader teaching context		
Baranowski (2006)	Prior experience	Previous exposure to material on the legislative process, *prior knowledge (exam score)*
	Preparation	Lecture, reading
	Motivational aspects	*Interest in politics*
	YES/NO simulation group	*YES/NO simulation group*
Levintova & Mueller (2015)	Demographics	Gender
	Preparation	*YES/NO lecture*
Rünz (2015)	Demographics	Gender, *age*, *nationality*, *major*
	Prior experience	*Mobility*, *prior knowledge*
	Motivational aspects	*Interest in EU*
	Beliefs	*Political efficacy*, European identity, national pride
	YES/NO simulation group	*YES/NO simulation group*
Student characteristics + simulation process		
Kalaf-Hughes & Mills (2016)	Prior experience	*Prior knowledge (GPA)*
	Motivational aspects	*Political interest*

Played role	*Legislative vs executive role*

[*] Elements related to variation in learning outcomes are presented in italic

Note: As already shown by Baranowski and Weir (2015), in general study results are in favour of the use of role-play simulations of decision-making when fostering student learning. However, a valid interpretation of results would include a thorough methodological evaluation of studies' designs, which exceeds the aim and scope of this review.

The typology includes three categories of published research. The first and largest category is the *single* category, of which articles investigate learning outcomes without taking any other components into account. The second category is the *double* category, of which articles investigate learning outcomes when considering one other MISTER-model component, either student characteristics, elements of the broader teaching context, or aspects of the simulation process. Studies including student characteristics mostly focus on student demographics. Elements from the broader teaching context that have been taken into account are preparation, and the comparison of yes-no simulation groups. The played role is the only aspect of the simulation process that has already been investigated in relation to learning outcomes. The third *master* category includes articles that consider more than one MISTER-model component when investigating learning outcomes.

Studies from the *double* and *master* category attempt to take contextual features into account, however review results show few consistency in which aspects are being considered (Table 4). Overall, within each category study features show substantial variation in reported and included learning environment components when investigating student learning outcomes of role-play simulations of political decision-making (Appendix A, Table 4).

5. Discussion and conclusion

This review probes into the learning environment of role-play simulations of decision-making, which should be considered valuable as simulations enable bridging the gap between education and work-related contexts (Breckwoldt et al., 2014; Ellington et al, 1998; Tynjälä, 2008). More specifically, this review explores the use of these simulations within political science education, which already have a long history in implementing such learning environments in educational contexts (Guetzkow et al., 1963). Arguing that capturing simulation's effects is complicated by more than just the issue of operationalization (e.g., Baranowski & Weir, 2015), the aim of this review is as follows: to provide a comprehensive overview of learning environment components, to detect patterns with reported learning outcomes, and to investigate to what extent current research has already taken such learning

environment components into account. To summarize, we first clarify how results point to complex learning environments with various contextual features. Second, as current research has limitedly and inconsistently taken contextual factors into account, we call for a more coherent research agenda. Finally, we conclude by addressing how this review, specifically conducted within the context of political science education, contributes to increasing educational expertise about role-play simulations of decision-making in general.

5.1 Variation of the learning environment of role-play simulations of decision-making

Review findings show substantial contextual variation between different simulation-based learning environments and no clear pattern between reported learning environment characteristics and reported learning outcomes.

Complexity of the learning environment of role-play simulations of decision-making shows in several ways. Probing into the specific learning environment components, role-play simulations are organised for a variety of student groups that are composed of students with various backgrounds. The broader teaching context, including simulation design, varies extensively and complicates filtering the contribution of the simulation itself when measuring learning outcomes. For example, studies including meetings that involve knowledge sharing in their simulation preparation have a risk of biased results when eventually measuring knowledge related learning outcomes as proof of simulation effects on student learning. The definition of process activities shed a new light on which aspects define role-play simulations of decision-making that are clearly a type of social learning shaped by the simulation program (formal/informal), type of teacher involvement and assigned role. Looking into which learning outcomes have been reported shows a far richer spectrum than initially thought of when analysing set learning objectives. Complexity within and the large variation between role-play simulations of political decision-making learning contexts represent experienced struggles when developing educational expertise (e.g., Baranowski & Weir, 2015).

Overall, because no two reported learning contexts are the same, the specific learning environment in which the research was conducted should each time be considered when interpreting research results. As such, how these learning environments exactly foster learning outcomes should be considered as embryonic. This leads us to the next question of how related educational expertise can be increased.

5.2 Avenues toward more educational expertise

Aiming for more educational expertise, the third and last research question addressed the extent of which current research already takes contextual factors into account when investigating the effect of role-play simulations of decision-making on student learning outcomes. The defined typology represents an extremely scattered research field that either lacks taking learning environment components into account (e.g., teacher involvement) or that includes such components inconsistently (e.g., prior experience). Review findings confirm the need for more educational expertise, which applies to two domains: when sharing and when investigating simulation-based practices.

5.2.1 Sharing simulation-based practices

Applying the MISTER-model to map role-play simulations of decision-making has resulted in a comprehensive overview of various elements that shape the simulation-based learning environment. As results strikingly reveal that no two studies describe the teaching context in a similar way, implementing the use of the MISTER-model framework when sharing practices would advance the field in two ways. First, applying the model forces teachers and researchers to look further than simulation design when describing the simulation-based teaching context. Second, it would forward the field in defining differences and similarities between simulations in a thorough way. However, one caveat might be that some features sometimes have been present but not yet have been reported in any study, and as such are not included in the current model. Another caveat might be that this review focuses on a specific type of role-play simulations of decision-making, selected after applying a specific set of inclusion criteria. Therefore, the model probably lacks characteristics of other distinguishable but related contexts, for example of online role-play simulations of decision-making. Considering both caveats, the developed framework of MISTER-model should be considered as a guiding rather than a prescriptive tool.

5.2.2 Investigating simulation-based practices

This review points to contextual variation as significant contributing factor that partly clarifies the experienced struggles when investigating learning outcomes of role-play simulations of decision-making. Because this review subordinates methodological issues to contextual issues, this could be considered as a limitation. However, others have already more generally addressed the issue of operationalization (e.g., Baranowski & Weir, 2015). Specifically related to operationalization, this review reveals substantial variation in used measures when describing sample features. Even in the *master* category measures vary from

solely using course-elements (Levintova & Mueller, 2015) to conducting pre- and post-measurements (Rünz, 2015). Based on current review findings, the following should be considered to increase educational expertise in role-play simulations of decision-making.

First, current findings suggest that learning outcomes might be far more diverse than those considered initially. Considering this diversity, there is the need for a more interdisciplinary approach. Research has already shown that a more coherent research agenda is needed to avoid ambiguity and inconsistency in results across studies (Dinsmore & Alexander, 2012). In the case of learning outcomes that are not directly related to the political science discipline, such as motivation and self-regulation, educational sciences could fill the gap.

Second, considering the extensive variation in student factors and broader teaching context, their relationship with learning outcomes needs further exploring. This should result in taking them more often into account when investigating learning outcomes. In general, considering the previously defined typology, research should move away from the *single* category and move toward the *master* category that combines different components of the MISTER-model. Research can gradually build expertise by expanding the amount of included elements. It seems that the biggest black box is how the simulation process itself exactly contributes to student learning. Simulation's contribution should be distinguished from other aspects as the broader teaching context, such as preparation activities, and student factors, such as prior knowledge.

Third, role-play simulations are complex environments because of other than simulation-related influencing factors combined with unpredictable social dynamics within the simulation. Unravelling simulation's complexity faces three challenges. The first challenge consists of increasing expertise in the simulation process and how this relates to other elements. The second challenge is that of designing our research in such a way that outcomes do not only rely on self-report measures, which are highly dependent on respondent's reflective skills. The third and final challenge relates to simulation-contexts of in-class simulations that often include small samples sizes. Overall, tackling these challenges primarily results in the need for thoroughly designed in-depth research, which gradually should increase expertise over time.

Fourth, next to assessing immediate learning outcomes, future research should also include learning transfer to elucidate the long-term benefits of role-play simulations of decision-making (Kirkpatrick & Kirkpatrick, 2006). Therefore, research should use

longitudinally designs and appropriate analyses such as multilevel growth modelling, or latent growth modelling to reveal relationships between learning outcomes and other elements.

5.3 Across disciplines

The simulations discussed in this review relate to specific political science contexts, however, learning outcomes also include more generic skills that carry across disciplines, such as writing, presenting, negotiating, etc. This makes them interesting learning environments, of which more educational expertise would be beneficial for more than just political science education. Similar role-play simulations are implemented within medical, management, and law education. Moreover, such learning contexts are valuable because they are at the crossroad of education and workplace. In addition to the above research suggestions, increasing expertise will thus most certainly rely on already existing educational as well as workplace learning related insights.

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Appendix A

Overview of MISTER-model components.

	Presage																								Process			Product			
	Student factors				Teaching context																							Results**			
					Simulation design					Objectives				Preparation						Debriefing		Assessment						CLO		ALO	RLO
Study	D	PE	M	B	C	Se	T	Si	D	K	S	Co	Mo	Me	Re	W	Pr	RA	WA	O	Pre	P	Post	IP	TI	PR	K	S		
Andanova & Mendoza-Castro (2008)	X				IR	UN	C	ES	SC	X	X		X	X	X	X	X		X		X		X	X	X		X	X	X	
Baranowski (2006)	X	X	X		CP	USC	C	S	C					X	X			X		X					X		X			
Baranowski & Weir (2010)	X				CP	USC	C		C	X				X	X			X		X					X	X	X			
Bernstein (2008)	X			X	CP	USC	C	S	SD	X	X	X	X	X	X	X			X									X	X	X	
Bertsch & Feste (1974)	X				EU	O	C		SD	X			X		X	X						X			X		X	X	X	
Biziouras (2013)	X				CP	NSC	C	S	C	X				X	X	X			X	X							X			
Chernotsky (1990)	X				CP	NSC	C	S	SC	X				X	X			X		X					X	X	X			
Ciliotta-Rubery & Levy (2000)	X				CP	USC	C		SC	X	X		X		X				X								X	X		
Cowley & Stuart (2015)	X				CP	O	C	S	C	X				X				X		X					X		X			
Crossley-Frolick (2010)	X				IR	UN	C	S	SC	X	X		X	X	X	X		X	X	X	X		X		X	X	X	X	X	X	
DiCicco (2014)	X				CP	NSC	C		SC	X	X	X		X	X	X	X	X		X	X	X			X	X		X	X	X	
Elias (2014)	X				EU	EU	C	M	SC	X	X			X	X	X				X	X	X	X		X	X		X	X		

	Presage																								Process			Product			
	Student factors				Teaching context																							Results**			
					Simulation design					Objectives				Preparation					Debriefing		Assessment							CLO		ALO	RLO
Study	D	PE	M	B	C	Se	T	Si	D	K	S	Co	Mo	Me	Re	W	Pr	RA	WA	O	Pre	P	Post	IP	TI	PR	K	S		
Foster et al. (1980)	X				CP	UP	C			X																	X			
Frederking (2005)	X				CP	USC	C		SC	X	X			X	X	X		X	X	X							X	X	X	
Galatas (2006)	X			X	EU	EU	C	ES	SC	X				X	X	X		X						X	X		X			X
Hazleton & Mahurin (1986)	X			X	IR	UN	H	EL		X	X			X	X	X	X	X			X	X	X				X			
Jones (2008)	X		X	X	EU	EU	H	EL	SD	X	X														X		X	X	X		X
Jones & Bursens (2015)	X			X	EU	EU	H	EL	SD					X	X	X			X					X	X		X	X	X		
Jozwiak (2013)	X				EU	EU	C	S	SC					X	X	X	X			X				X	X		X	X	X		
Kalaf-Hughes & Mills (2016)	X	X	X		CP	USC	C	S	SC	X				X	X	X		X	X					X		X	X	X			
Levintova et al. (2011)	X				IR	UN	C	EL		X	X	X		X	X				X	X				X			X	X	X		
Levintova & Mueller (2015)	X				IR	UN	C	EL		X				X	X				X	X							X				
Lowry (1999)	X				IR	O	C	S	D	X				X	X	X		X		X	X	X			X		X		X		
Mariani & Glenn (2014)	X	X	X		CP	USC	E	M	SC	X	X	X			X	X		X		X	X	X		X	X		X	X	X		
Mathews & LaTronica-Herb (2013)	X				CP	USC	C	S	SC	X	X		X	X		X			X					X			X		X		
Obendorf & Randerson (2013)	X				IR	UN	H		D	X	X			X	X	X	X	X	X	X	X	X	X	X	X		X	X	X		
Osgood et al. (2012)	X				CP	UP	C	S	SC	X			X	X*	X	X		X	X	X					X		X		X		

	Presage																							Process			Product			
	Student factors				Teaching context																						Results**			
					Simulation design					Objectives				Preparation					Debriefing		Assessment						CLO		ALO	RLO
Study	D	PE	M	B	C	Se	T	Si	D	K	S	Co	Mo	Me	Re	W	Pr	RA	WA		O	Pre	P	Post	IP	TI	PR	K	S		
Rackaway & Goertzen (2008)	X				CP	USC	C	S	C	X	X			X	X			X	X		X		X	X				X	X		
Rinfret (2012)	X				CP	UP	C	S	SC	X				X*		X		X	X				X	X				X			
Rinfret & Pautz (2015)	X				CP	USC	C	S	SC	X				X	X	X		X			X	X	X		X			X			
Ripley et al. (2009)	X				IR	UN	E	S	D	X	X							X							X			X	X		
Rünz (2015)	X	X	X	X	EU	EU	E	EL	SD	X															X			X		X	
Sands & Shelton (2010)	X				CP	USC	C	S	SC	X				X				X	X		X		X	X		X		X			
Taylor (2011)	X				CP	UP	C	S	SC	X	X			X		X		X			X	X	X	X		X		X		X	
Wallin (2005)	X				CP	USC	C	M	SC	X				X	X	X		X					X		X	X		X	X	X	
Zaino & Mulligan (2009)	X				M	O	C	L	D	X				X	X	X		X			X	X	X		X	X		X			

Student factors: D – Demographics, PE – Prior experience, M – Motivational aspects, B – Beliefs; Simulation design: C – Content (IR – International relations, EU – European studies, CP – Comparative Politics, M - Mixed), Se – Setting (UN – United Nations, EU – European Union, USC – US Congress, NSC – National Security Council, UP – Urban Politics, O – Other), T – Type (C – Course-embedded, E – Extra-curricular, H – Hybrid), Si – Size (XS – < 15, S – 15-35, M – 35-70, L – 70-120, XL – >120), D – Duration (C – 1 class, SC – Several classes, D – 1 day, SD – Several days); Objectives: K – Knowledge & Understanding, S – Skills, Co – Confidence, Mo – Motivation; Preparation: Me – Meetings, Re – Research, W – Writing, Pr – Presenting, RA – Role assignment; Debriefing: WA – Written assignment, S – Survey, O – Oral debriefing; Assessment: Pre – Pre-simulation assignments, P – Simulation Performance, Post – Post-simulation assignments; Process: IP – Informal program, TI – Teacher involvement, PR – Played role; Learning outcomes: CLO – Cognitive learning outcomes: K – Knowledge & Understanding, S – Skills; ALO – Affective learning outcomes; RLO – Regulative learning outcomes; *These meetings include one attendance at a local government meeting; ** Coloured boxes show previously set objectives.

Appendix B

Detailed overview of reported learning outcomes.

Cognitive learning outcomes – Knowledge & understanding			
Theoretical concepts	Decision-making process	Policy field	Citizenship
Andanova & Mendoza-Castro (2008)	Andanova & Mendoza-Castro (2008)	Bertsch & Feste (1974)	Bernstein (2008)
Crossley-Frolick (2010)	Baranowski & Weir (2010)	DiCicco (2014)	Levintova et al. (2011)
Foster et al. (1980)	Baranowski (2006)	Elias (2014)	Rünz (2015)
Frederking (2005)	Bertsch & Feste (1974)	Foster et al. (1980)	
Kalaf-Hughes & Mills (2016)	Biziouras (2013)	Levintova & Mueller (2015)	
Levintova & Mueller (2015)	Chernotsky (1990)	Levintova et al. (2011)	
Lowry (1999)	Ciliotta-Rubery & Levy (2000)		
Osgood et al. (2012)	Cowley & Stuart (2015)		
Taylor (2011)	Crossley-Frolick (2010)		
	DiCicco (2014)		
	Elias (2014)		
	Foster et al. (1980)		
	Galatas (2006)		
	Hazleton & Mahurin (1986)		
	Jones (2008)		
	Jones & Bursens (2015)		
	Jozwiak (2013)		
	Kalaf-Hughes & Mills (2016)		
	Mariani & Glenn (2014)		
	Mathews & Latronica-Herb (2013)		
	Obendorf & Randerson (2013)		
	Osgood et al. (2012)		
	Rackaway & Goertzen (2008)		
	Rinfret (2012)		
	Rinfret & Pautz (2015)		
	Ripley et al. (2009)		
	Sands & Shelton (2010)		
	Taylor (2011)		
	Wallin (2005)		

		Zaino & Mulligan (2015)					
Cognitive learning outcomes – Skills							
Writing	Research	Collaborating	Oral communication	Negotiating	Analytical-critical thinking	Problem solving	Political skills
Frederking (2005)	DiCicco (2014) Elias (2014)	Bernstein (2008) DiCicco (2014) Elias (2014) Jones & Bursens (2015) Jozwiak (2013) Mariani & Glenn (2014) Wallin (2005)	Crossley-Frolick (2010) DiCicco (2014) Frederking (2005) Jozwiak (2013) Ripley et al. (2009)	Andanova & Mendoza-Castro (2008) Ciliotta-Rubery & Levy (2000) DiCicco (2014) Jones & Bursens (2015) Jozwiak (2013) Levintova et al. (2011) Wallin (2005)	Kalaf-Hughes & Mills (2016) Rackaway & Goertzen (2008)	Bertsch & Feste (1974)	Bernstein (2008) Mariani & Glenn (2014) Obendorf & Randerson (2013)

Affective learning outcomes				
Motivation	Interest	Engagement	Confidence	Political efficacy
Bertsch & Feste (1974) Lowry (1999) Taylor (2011) Wallin (2005)	Andanova & Mendoza-Castro (2008) Bertsch & Feste (1974) Frederking (2005) Jozwiak (2013) Mariani & Glenn (2014) Osgood et al. (2012)	Andanova & Mendoza-Castro (2008) Crossley-Frolick (2010) DiCicco (2014) Jozwiak (2013) Levintova et al. (2011) Mariani & Glenn (2014) Mathews & Latronica-Herb (2013) Obendorf & Randerson (2013) Wallin (2005)	DiCicco (2014) Jones (2008) Jones & Bursens (2015)	Bernstein (2008) Levintova et al. (2011) Mariani & Glenn (2014) Rünz (2015)

Regulative learning outcomes	
Self-directing behaviour during simulation	Intended behavioural changes after simulation
Crossley-Frolick (2010) Galatas (2006)	Jones (2008)

Appendix C

Number of studies that report on which learning outcomes based on MISTER-model components ($N_{total} = 36$)

MISTER-model components		CLO	CLO + ALO	CLO + RLO	CLO + ALO+ RLO	n
Student factors						
Demographics		14	12		1	27
Demographics – beliefs		1	2	1		4
Demographics – motivational aspects – beliefs					1	1
Demographics – prior experience – motivational aspects		2	1			3
Demographics – prior experience – beliefs			1			1
Simulation design						
Context	IR	4	4		1	8
	EU Studies	2	3	1	1	7
	CP	12	8			20
	Mixed	1				1
Setting	European Union	2	2	1	1	6
	United Nations	3	3		1	7
	US Congress	7	5			12
	National Security Council	2	1			3
	Urban politics	2	2			4
	Other*	2	2			4
Type	Course-embedded	15	12	1	1	29
	Extracurricular	2	1			3
	Hybrid	1	2		1	4
Size	Extra-small (< 15)		1	1		2
	Small (15 – 35)	10	6		1	17
	Medium (35 – 70)	1	2			3
	Large (70 – 120)	1				1
	Extra-large (> 120)	3	2		1	6
Duration	1 class	5				5
	Several classes	7	9	1	1	18
	1 day	2	2			4
	Several days	1	3		1	5
Broader teaching context						
Preparation	Meetings	2				2
	Research	1				1
	Meetings – Research	5	1			6
	Meetings – Writing	1	2			3
	Research - Writing		2			2
	Meetings – Research – Writing	5	6	1	1	13
	Meetings – Research – Writing - Presentations	1	4			5
Role assignment	Random	4		1		5
	Student preferences	3	4			7
	Student characteristics	4	3		1	8
	Selection procedure	1	1			2
Debriefing	Oral	6	5			11
	Written	3	4			7
	Both	5	4		1	10
Assessment	Performance		2			2
	Pre-assignment + Performance	2	3			5
	Pre- + Post-assignment		1		1	2
	Performance + Post-assignment	3				3
	Pre-assignment + Performance +	2	2			4

MISTER-model components		CLO	CLO + ALO	CLO + RLO	CLO + ALO+ RLO	n
	Post-assignment					
Simulation process						
Informal simulation program	YES	5	10	1	1	17
	NO	12	6		1	19
Teacher involvement	Participant	3	5		1	9
	Semi-involved	4	5	1		10
	Absent		1		1	2
Played role		3				3

CLO – Cognitive learning outcomes, ALO – Affective learning outcomes, RLO – Regulative learning outcomes;

* WTO (GATT negotiations), British parliament (chief whips), Eastern Europe (the Warsaw treaty organisation), Mixed simulation