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Role-play experience's effect on students' 21st century skills propensity

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ABSTRACT

This study examines the effects of a role-play-based pedagogical method in Finland on the twenty-first century skills propensity among 6th graders (12-year-olds). The approach entails a simulation of a society in a gamified learning environment as part of their formal education. Structural Equation Modeling was employed to analyze the students' ($N = 253$) self-reported effects of role-play experience on pre-and post-scores of twenty-first century skills propensity. The results show a statistically significant positive relation between holistic role-play experience and twenty-first century skills propensity, however, closer exploration reveals only few key associations, which perhaps illustrates the complex nature of both role-playing and the framework of twenty-first century learning. However, the broader positive view demonstrates the potential of one meaningful playful day for the skill and attitude development of young students as part of a formal curriculum.

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Edu-larp; gamification; learning environment; role-play; 21st century skills

Introduction

Education, schools, and other learning institutes are continuously expected to meet the standards of an ever-changing world and prepare students for their future careers (Ananiadou & Claro, 2009). Recent years have shown how increasingly challenging it is to predict the future job market as novel professions emerge and existing jobs are altered by modern technology. To gain a meaningful understanding of what exactly is expected from students and schools, a framework for twenty-first century learning is often employed to support curricula, learning environments, and educational methods (Ahonen & Kinnunen, 2015; Alismail & McGuire, 2015; Mäkelä et al., 2014). It depicts the necessary skills, such as flexibility, responsibility, communication, and collaboration, required for subjective and collective well-being as well as success in response to current societal changes, fragmented career paths, and other uncertainties that are unique to the twenty-first century (Kay & Greenhill, 2011; Ranta et al., 2022).

However, students, especially at young ages, do not always exhibit interest in or engagement with holistic and future-oriented citizenship skills and attitudes that are part of the twenty-first century framework, even when scoring high points in civic and societal knowledge (Mehtäläinen et al., 2017). To support children in becoming healthy, active, and contributing citizens and to help them understand the world around them, formal civic education programs with a focus on twenty-first century skills are emphasized already from younger years (Bratitsis et al., 2017; Hassan & Hamari, 2020; Litts et al., 2020). These programs increasingly utilize active and playful pedagogical tools, such as gamification and storification (Aura et al., 2021; Chen & Stoddard, 2020; Oberle et al., 2020), to meaningfully translate acquired knowledge into behavioral and attitudinal changes (Qian & Clark, 2016). As part of gamification and storification, practices of educational role-play and characters are especially capable of providing students with a variety of experiences of social interactions, multiple viewpoints, and deepening the acquired theoretical knowledge (Poorman, 2002; Raphael et al., 2010). However, role-play can also be resisted and perceived as intimidating if implemented poorly (Kerr et al., 2010; Nestel & Tierney, 2007). While the use of individual game, role-play, and story elements have long been utilized in schools, more complex applications of gamification of education still remain rather scarce.

One example of a pedagogically designed gameful learning environment combining gamification and role-play is *Yrityskylä (Me and MyCity) Primary School* by *Economy and Youth TAT* in Finland. Me and MyCity provides 6th graders (12-year-olds) a unique learning environment where students simulate society and work through role-play and other gameful activities. Me and MyCity is highly popular in Finland and has become a curricular part of formal education in over 80% of Finnish primary schools, however, extensive scientific research of its benefits and detriments is still lacking. The only prior study on Me and MyCity

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Primary School examined its effects on formal learning of economic issues as well as attitudes toward consumption and savings behavior and found an increase in students' financial knowledge but no significant growth in the propensity to save money (Kalmi, 2018). In our research, we are interested in how Me and MyCity meets the framework of twenty-first century learning and how the gamified learning environment with role-playing supports it. The purpose of this study is to answer the following question: *How does role-play-based pedagogy affect students' twenty-first century skills propensity?* The aim is to quantitatively measure students' role-play experience and its association with twenty-first century skills propensity (skills and attitudes) before and after Me and MyCity. Understanding the impact of Me and MyCity allows better insight into active, game-, and role-play-based educational methods and how they can be utilized internationally on a larger scale to design and support socially and educationally engaging, effective, and enjoyable pedagogical tools.

Background

Twenty-first century skills in education

In the educational field, there has been a growing interest in the framework of twenty-first century learning, the skills it comprises, and their emergence in contemporary formal education (Chalkiadaki, 2018). Originally, the framework was developed to address the rapid changes in society, economy, and job market, which demanded attention from governments, educational systems, and scholars to identify and deliver competences that individuals need in modern society (Ananiadou & Claro, 2009; Voogt & Roblin, 2012). This has resulted in several models by various sources, which aim to describe the core skills and abilities of the twenty-first century. The renowned models by, for example, Assessment & Teaching of twenty-first Century Skills (Care et al., 2018), Battelle for Kids Partnership 21 (P21) (Battelle for Kids, 2019), and the Definition and Selection of Competences (Rychen & Salganik, 2003), are largely aligned in terms of what twenty-first century competencies are and why they are important. Generally, the twenty-first century skill sets are recognized as higher order abilities that enable overcoming complex situations, as well as being transversal (i.e., being relevant across fields) and multidimensional (i.e., in knowledge, skills, and attitudes) (Voogt & Roblin, 2012; Westera, 2001). However, between the various models, unified practical implications and intentions for how to integrate them into curricula are still lacking (Voogt & Roblin, 2012).

The model employed in this study is the Battelle for Kids Partnership 21 (P21), which is frequently adopted in schools and research for its granularity and appropriateness in terms of key competences and its focus on business, as it is developed with input from teachers, education experts, and business leaders (Battelle for Kids, 2019). The latter was especially important for our study, given our focus on working life skills as we outline in the methods section later. In addition to core academic subjects (such as math, literacy, history, etc.), P21 divides the twenty-first century skills into three domains of *learning and innovation skills*; *information, media, and technology skills* and *life and career skills*. Learning and innovation skills include abilities, such as creativity, critical thinking, communication, and collaboration. Information, media, and technology skills consist of information, media, and ICT literacy. Lastly, life and career skills include e.g., adaptability, self-direction, productivity, responsibility, and leadership skills. The main critique of the P21 model has been its overly positive position on transferable and personality skills, diminishing the importance of core subjects and general knowledge. The developers of P21 have addressed this critique stating that teaching of twenty-first century skills could never be separated from content, since "knowledge is the base of learning" (Cavanagh, 2009; Kay & Greenhill, 2011). However, knowledge can change, especially in these times of the internet and floods of information, and therefore youngsters should be equipped with learning skills as well as flexibility, adaptability, and other traits included in the twenty-first century skillset, to help them cope in modern society (Geisinger, 2016).

In line with prior literature discussing the practical implications of twenty-first century models (e.g., Chalkiadaki, 2018; Voogt & Roblin, 2012), Lucas (2019) urges the educational field to design sustainable and pragmatic pedagogical solutions for teachers to embed twenty-first century learning in formal education. However, as the lack of consistency in twenty-first century models' practical intentions imply (Voogt & Roblin, 2012), teaching these skills in practice involves several challenges. Firstly, schooling and learning today are increasingly evaluated through student performances and tests, which mainly examine skills that are measurable, such as math, science, or linguistics, while skills, such as teamwork and responsibility are not formally examined or evaluated (Care et al., 2018; Kay & Greenhill, 2011). This results in an emphasis on teacher-centered learning, where students are prepared for upcoming tests but perhaps not for life in general. Moreover, while teachers aim to integrate the learning of social abilities and twenty-first century skills into academic subjects, they often lack the proper tools and methods to do so (Kangas, 2010; Parker & Thomsen, 2019). The solutions to these challenges could partially exist in active and meaningful pedagogical tools, such as TAT Me and MyCity that aim to combine both content learning and students' personal development, which could provide valuable and efficient pedagogical support for teachers.

Role-play-based pedagogy

Whilst the debates on effective education in terms of learning, resources, and teachers' role are perennial, modern pedagogical research recognizes the value of social, collaborative, and interactive education (Dewey, 1910; Parker et al., 2022). Today, global educational policies are increasingly highlighting the benefits of problem-based, phenomenon-based, and active learning, which further reflects curricula contents through the emphasis on, for example, twenty-first century skills (Darling-Hammond, 2006; Vincent-Lancrin et al., 2014). Controversially, policymakers put much weight on

international assessments, such as PISA (Program for International Student Assessment), which do not necessarily acknowledge the importance of play or social learning in pedagogical activities (Eivers, 2010). Nevertheless, teachers are increasingly interested in implementing active learning efficiently in their formal schooling, which perhaps is not a straightforward process, however, numerous approaches exist in such endeavors.

One of the practices of making education active, playful, and social is role-play. Role-play stems from theories of play (e.g., Huizinga, 1938; Vygotsky, 1978) and today in educational research it is often described to fall under the umbrella term of gamification (Hamari, 2019). In role-play, students are often required to embody characters and perspectives different from their own, encouraging them to explore relationships, meanings, and materials (Shapiro & Leopold, 2012; Shor, 1992), which, at best, facilitates both content delivery as well as students' natural playful and social behavior. However, whilst role-play has many forms and has been utilized in formal education for decades, there is a growing curiosity for more complex and engaging gamified learning experiences (Aura et al., 2022; Hassan & Hamari, 2020; Parker et al., 2022). Ideally, these experiences could be intuitively integrated into the daily activities of schools to further strengthen aspects of curricular requirements and students' psychological needs in terms of social and affective development, as well as providing pedagogical support for teachers in the midst of external pressure and demands.

The pedagogical value of role-play and, more recently, educational live action role-playing games, i.e., *edu-larps*, has long been recognized in formal education, especially as means to teach, for example, social sciences (Maddrell, 2007), problem-solving (Hoge, 2013) and general twenty-first century skills, such as communication and critical thinking (Bowman, 2014; Vanek & Peterson, 2016). Edu-larps are a pedagogical outgrowth of *larps*, which are a form of game play letting participants physically embody characters in fictional scenarios that may or may not portray mundane reality (Bowman & Standiford, 2015; Järvelä, 2019; Lankoski & Järvelä, 2012). The forms of learning that edu-larps facilitate are hands-on approaches, socially co-constructed activities, and reflecting back on the experiences to form meaning of what was done and observed (Bowman, 2014). Essential learning through edu-larps is about concreteness and human interaction, which are also emphasized in theories of experiential learning by Kolb (1983) and situated learning by Lave and Wenger (1991), further relating to Dewey's theory of learning by doing (Dewey, 1910). In experiential and situated learning theories students' authentic experience is at the core of learning, aiming to build bridges between theory and practice (Kolb, 1984; Lave & Wenger, 1991), whereas in traditional learning students are perhaps expected to receive and assimilate information passively (Stewart, 2012). Overall, the concrete experience of edu-larps and role-playing aims to connect subject matter with visceral memory, presumably supporting all learning dimensions of cognitive, affective, and behavioral development (Bowman, 2014).

Studies have shown role-play and edu-larps are effective pedagogical tools with which to approach complex topics as well as enhance students' self-efficacy, empathy, and perceived competence through the facilitation of intrinsic motivation as a result of playful behavior (Bowman, 2014; Harviainen & Savonsaari, 2013). However, scholars, such as Harder (2007) and Mochocki (2023) emphasize the importance of game design's quality in terms of attaining beneficial outcomes and that edu-larps are better suited for revising and internalizing skills and information, rather than acting as the initial exposure to the subject matter. Additionally, measuring the effects of edu-larps in a statistically effective way has been proven challenging (Bowman & Standiford, 2015; Vanek & Peterson, 2016), thus their direct academic efficacy is difficult to judge. With these benefits and limitations, edu-larps share many similarities with, for example, gamified learning and learning through play, hence, they may be considered as a form of role-playing in gameful learning environments (Bowman, 2014), such as TAT Me and MyCity.

Methods

Description of Me and MyCity

TAT Yrityskylä (Me and MyCity) Primary School is a learning environment, aligned with the Finnish national core curriculum for basic education (Finnish National Agency for Education, 2016) that provides schools with a tool to teach 6th grade students about work, economy, and society. The service is provided by the company *Economy and Youth TAT* and it is purchasable for municipalities. Me and MyCity as a whole provide teacher training, 10 in-class lessons with a workbook, and a one-day visit (~5 h) to the gamified learning environment (see Figure 1). The focus of this research is on the gamified learning environment, which is a simulation of a city, where students role-play as consumers, citizens, as well as work different professions in various enterprises, complete simulated work tasks and earn in-game currency for their work. Additionally, students vote in city elections, open an in-game bank account, and spend their salary on consumables (e.g., pencils, candy) or services (e.g., at a hairdressing salon or on a VR game experience) provided by other students. Overall, the environment allows learners to practically enact knowledge and skills they had been theoretically learning in the Me and MyCity lessons thus far. Me and MyCity reaches ~85% of Finnish 6th graders every year and it has 10 facilities throughout the country, in cities, such as Helsinki, Tampere, and Oulu.

Participants

The participants of this study are 6th grade students (11–13-year-olds) ($N = 253$) from Finnish primary schools who participated in Me and MyCity during the semesters of fall 2021 or spring 2022. The schools are located in three different regions of Finland: western (47.4% of the participants), southern (33.6%), and northern (17.4%) Finland.

Figure 1. The gamified learning environment of Me and MyCity (images included with permission).

Table 1. Participant demographics.

Gender	*n*	%	Native language	*n*	%	Region of Finland	*n*	%
Girl	119	47.0	Finnish	210	83.0	Western	120	47.4
Boy	93	36.8	Other	19	7.5	Southern	85	33.6
Other	8	3.1	Missing	24	9.5	Northern	44	17.4
Prefer not to say	9	3.6				Missing	4	1.6
Missing	24	9.5						
Total	253	100%		253	100%		253	100%

However, as Finland has a relatively small population and the Finnish schools represent one of the most equal and quality educational systems in the world, the territorial differences are not expected to be of significance (Chzhen et al., 2018). The majority of the participants had Finnish as their native language (83%), and nearly half of the participants were girls (47%). Detailed student demographics can be found in Table 1. The only missing data points indicate that there were 24 students who chose not to fill out the survey section which gathered information on student demographics, as well as four students who chose not to fill out their school location but continued to participate in this study.

The participants were recruited in a collaborative effort with TAT, who informed which municipalities take part in Me and MyCity, and they also facilitated the coordination and recruitment process between researchers and teachers. Following local jurisdiction, official research permissions were then gathered from the municipalities that had enrolled to take part. Teachers could then enroll their class to participate in the study, after which appropriate information was distributed to the school principal as well as to the students' guardians. Since the participants were under the age of 15, research permissions were gathered from the students' guardians. Data collection, analysis, and reporting were all conducted independently from TAT, schools, or municipalities.

The study was voluntary and anonymous for all participating students, as well as their guardians, teachers, and schools. The requirement for ethical approval was waived by the Ethics Committee of the Tampere Region as the study involves no risks to the subjects and the official research permissions were gathered from participating municipalities and students' guardians, as is a custom in Finland. Additionally, it was ensured that the minors who take part in the study understand what the research is about and what participation requires of them by taking into consideration subjects' age and stage of development. All the participating parties had the right to withdraw from the study at any time without consequences.

Procedure and measurements

The participants answered questionnaires before and after attending the gamified learning environment. The use of repeated measures design with two time points allows the comparison of responses and assessment of the effectiveness of the intervention with the same individuals (Kraska, 2010). To maximize the ecological validity of the results, the children's experience in Me and MyCity was preserved and was not manipulated in any way. Hence, as the day in Me and MyCity differs greatly from a conventional school day and having a control group would not have been meaningful, the repeated measures design served our purposes best as each subject serves as its own control (Park et al., 2009; Singh et al., 2013). In the pre-survey, the students were asked to fill out questions regarding their demographics and prior twenty-first century skills propensity (i.e., skills and attitudes). The post-survey repeated the section on twenty-first century skills propensity and included additional sections on the role-play experience. All items in the survey were in Finnish.

The twenty-first century skills and attitudes were measured through the Battelle for Kids Partnership 21 (P21)

Framework (Battelle for Kids, 2019), which has 25 subdimensions in total. In our survey, we utilized 13 of those. Specifically, two subdimensions (communication and collaboration) from *learning and innovation skills*, as well as 11 subdimensions from *life and career skills* were included since they are aligned best with Me and MyCity's aims and the children's development stage according to TAT's pedagogical experts. The complete dimension of *information, media, and technology skills* (five subdimensions) and two dimensions from *learning and innovation skills* (seven subdimensions) were excluded since Me and MyCity does not aim to develop specifically these skill areas and to keep the survey as short as possible for young participants. The detailed list of all measured subdimensions is shown in Table 2. To measure students' attitudes and perceived skills on each subdimension, a self-report instrument containing statements of "I find this skill important" and "I find this skill interesting and exciting," as well as a statement of "I am good at it," was formed. Together, these three items create a variable of "twenty-first century skills propensity," which includes the concepts of both attitudes and skills. Students responded to all items using a 7-point Likert scale (from 1 = "Strongly disagree" to 7 = "Strongly agree").

The role-play experience of participants was measured using custom inventory that aimed to assess how the roles support and enable acting in the gameful Me and MyCity environment (see Appendix A). The inventory was created to fill the needs of this research project, as currently, the field lacks a survey instrument that specifically measures the overall role-play experience in gameful simulations. The inventory was formulated in iterative workshops in collaboration with experienced researchers from fields of e.g., cognitive psychology, education, semiotics as well as communication sciences, and is planned to be expanded upon in our future works. It has four dimensions: *action* (e.g., "In my role I had a chance to influence what was happening"), *attention* (e.g., "I became so absorbed in my role that I forgot everything else"), *collectivity* (e.g., "In my role I felt part of the group"), and *goals* (e.g., "My role fitted together with my goals"). The dimensions reflect how human behavior is fundamentally goal-directed (e.g., Bradley & Lang, 2007) and is limited by contextual affordances (Ramstead et al., 2016), and in case of joint activities, such as Me and MyCity, requires successful social coordination, collectivity and co-operation for inclusion and mutual benefit. In the data analysis, we investigated the inventory both as a whole as well as separately through its four subdimensions, to acquire detailed information on students' experience. Each subscale consisted of three items, and students responded to all items using a 7-point Likert scale (from 1 = "Strongly disagree" to 7 = "Strongly agree").

Table 2. P21 framework for twenty-first century skills (Battelle for Kids, 2019).

Domain	Dimension	Subdimension
Learning and innovation skills	Communication and collaboration	Communicate clearly
		Collaborate with others
Life and career skills	Flexibility and adaptability	Adapt to change
		Being flexible
	Initiative and self-direction	Manage goals and time
		Work independently
		Being a self-directed learner
	Social and cross-cultural skills	Interact effectively with others
		Work effectively in diverse teams
	Productivity and accountability	Manage projects
		Produce results
	Leadership and responsibility	Guide and lead others
		Being responsible to others

Data analysis

At the beginning of data processing, outlier removal and straight lining errors were done in SPSS (28.0.1.0) by examining variance. To test the research model, Partial Least Squares (PLS) Structural Equation Modeling (SEM) was utilized using SmartPLS (4.0.8.2) (Ringle et al., 2022). SEM is particularly suited to analyze complex relations in multivariate data. Whereas covariance-based SEM methods generally aim at confirming strict hypotheses by examining to what extent the observed data can produce the covariance matrix of the theoretical model (in other words, examining model fit), PLS-SEM aims at maximizing local factor loadings and explaining the variance in the model's dependent variables (Hair et al., 2021). Additionally, PLS-SEM is considered a suitable method when analyzing data slightly more exploratively with small- or moderate-sized samples and normally or non-normally distributed data sets (Hair et al., 2021).

To answer the research question, first, a reflective-formative model with a higher order construct for role-play experience and twenty-first century skills propensity was constructed to analyze the associations between all the role-play experience dimensions together and change scores (the difference between post- and pre-scores) of twenty-first century skills propensity (see Figure 2). To further explore how the dimensions of the roles affect skills propensity, we examined the separate effects of role dimensions through a second model of lower order constructs for role-play experience (see Figure 3). In both of the research models (Figures 2 and 3) twenty-first century skills propensity is modeled with the 3-form measurement of attitudes and skills ("I find this skill important," "I find this skill interesting and exciting," "I am good at it") in each of the subdimensions (see Table 2). To ensure the reliability of the used measures, low loading items (<0.7) were removed from the scales (Action 2 and Attention 1 were removed), see Table 3 and Appendix A.

Internal consistency/reliability of the scales was assessed using Cronbach's Alpha (α) and Composite Reliability (CR), and the values were found to be of acceptable level (>0.7, see Appendix B) (Cohen, 1988). Convergent validity of the scales was assessed with Average Variance Extracted (AVE) index, where >0.5 and <0.9 is considered acceptable level (Hair et al., 2021), and all lower order variables passed this threshold (see Appendix B). Discriminant validity was also at sufficient levels (<0.9) as assessed using Heterotrait-Monotrait (HTMT) ratio (Hair et al., 2021).

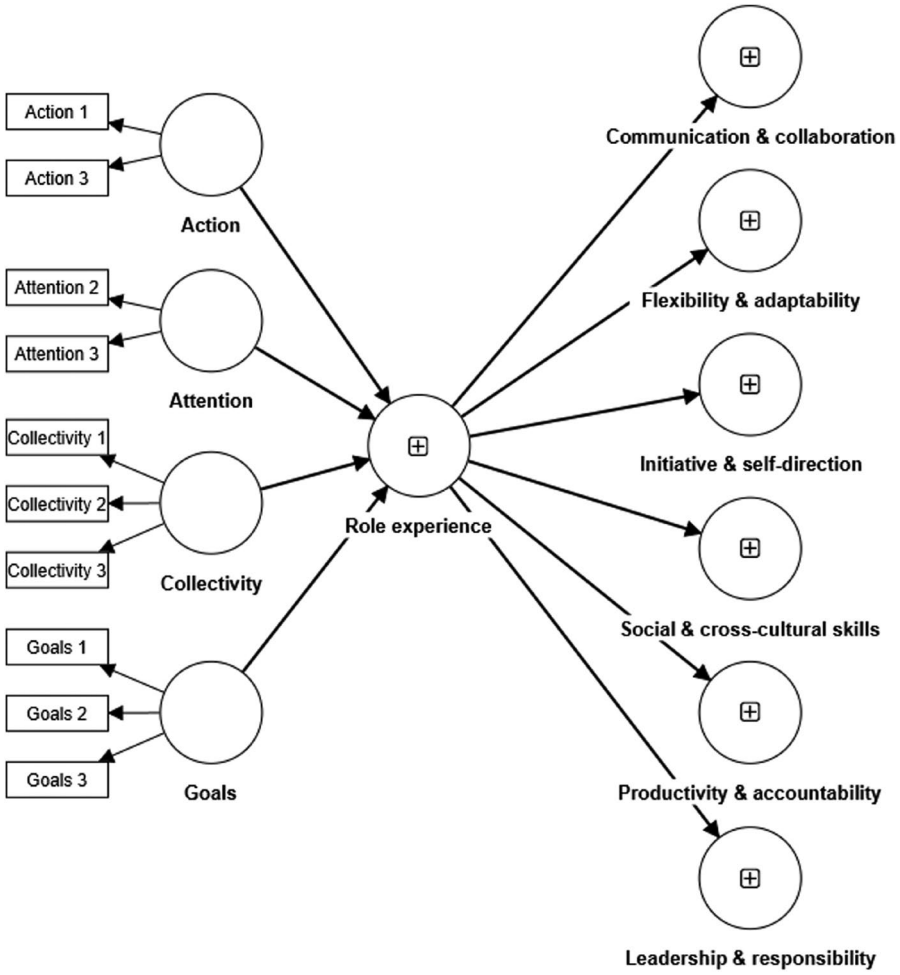

Figure 2. Research model with higher order role-play experience.

Results

Main analysis

The results for the model with high order role-play experience construct (Figure 2), which analyzed the associations between all the role-play experience dimensions together and change scores of twenty-first century skills propensity, indicate that, overall, the students' role-play experience has a positive relation to all examined twenty-first century dimensions ($p < .001$). That is, a higher role-play experience was associated with a larger positive change in self-reported skills and attitudes between before and after attending the gamified learning environment of Me and MyCity. Detailed information on the full results can be found in Table 4.

While *p*-values demonstrate a high degree of statistical significance on all examined relations, effect sizes (*f*-squares) show moderate effects (Cohen, 1988) on only dimensions of *social and cross-cultural skills* (.277) as well as *flexibility and adaptability skills* (.226). Effect sizes on *productivity and accountability* (.102), *leadership and responsibility* (.139), *initiative and self-direction* (.092) as well as *communication and collaboration skills* (.070) indicate only small effects (Cohen, 1988).

These results of the main analysis taken together indicate that role-play experience (i.e., how participants are able to act collectively in a goal-directed manner in their roles during the gameful simulation) is significantly associated with changes in 21st skill propensity, that is, how important they consider the skills to be, whether they are excited about them and whether they consider themselves to be good at them.

Explorative analysis

To explore the role-play experience's subscales' associations with twenty-first century skills propensity in more detail, a second model with lower order constructs for different dimensions of role-play experience (Figure 3) was analyzed. The results show that five associations were statistically significant ($p < .05$), while the rest of the associations (19 out of 24) were not (see Table 5). The significant positive relations were found in the following associations: *collectivity* with *flexibility and adaptability*, *attention* with *social and cross-cultural skills*, *goals* with *initiative and self-direction*, *action* with *social and cross-cultural skills*, and finally, *goals* with *social and cross-cultural skills*.

Notably, every subscale of the role-play experience instrument is represented in the significant associations, but only *goals* more than once. Effect sizes (*f*-squares) show only small effects (<.1) on all examined relations. The results suggest that perhaps not all aspects of role-play experience are

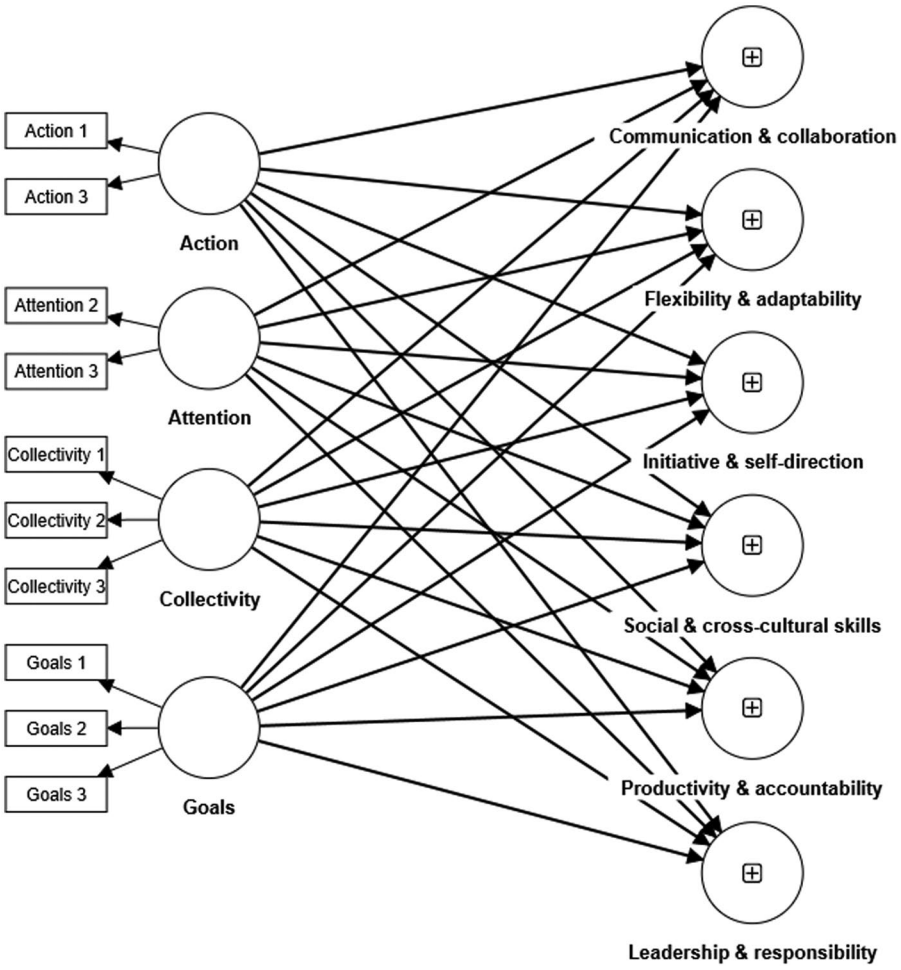

Figure 3. Research model with lower order role-play experience.

Table 3. Loadings for role-play experience instrument.

	Action	Attention	Collectivity	Goals
Action 1	0.879			
Action 3	0.841			
Attention 2		0.819		
Attention 3		0.842		
Collectivity 1			0.804	
Collectivity 2			0.880	
Collectivity 3			0.796	
Goals 1				0.864
Goals 2				0.852
Goals 3				0.788

equally important for all 21st skill propensities, but that some associations are highlighted over others. Some of these associations seem rather intuitive, for example, the feeling that their roles supported their *goals* was associated with *initiative and self-direction* skills. In particular, out of the five significant associations, three were to *social and cross-cultural skills*, which we interpret to highlight the emphasis on social aspects in general during the day. Detailed information on the full results can be found in Table 5.

Discussion

The aim of this study was to answer the research question of: *How does role-play-based pedagogy affect students' twenty-first century skills propensity?* Our main results indicate that, overall, role-play may serve as a meaningful and valuable pedagogical tool to facilitate attitude formation and twenty-first century skill acquisition of young students, which is in line with previous studies (e.g., S. Bowman & Standiford, 2015; Mochocki, 2023; Salminen-Tuomaala & Koskela, 2020; Vanek & Peterson, 2016). As assessed by the role-play experience inventory, adopting a role character appeared to have allowed students to act in embodied manner as citizens and employees of the simulated city, where twenty-first century skills are highly valued and even required to operate within given jobs, tasks, and social situations. Together the role-play dimensions of action, attention, collectivity, and goals facilitated students' twenty-first century skills propensity, which consists of both attitudinal changes toward the importance of the twenty-first century skills, as well as the perceived aptitude in the skills. This perceived change in students' mindsets is a rather notable outcome from only a day's long intervention.

The explorative analysis provided detailed insights into the role-play experience and highlighted a few key aspects that had a statistically significant association with some of the constructs of twenty-first century skills propensity. Skills of *flexibility and adaptability*, *initiative and self-direction*, as well as *social and cross-cultural skills* had a positive relation

Table 4. Total effects with higher order role-play experience variable.

Path	β	CI 2.5%	CI 97.5%	*f*-Square	*p*
Role-play experience -> Communication and collaboration	0.257	0.156	0.407	0.070	0.000*
Role-play experience -> Flexibility and adaptability	0.430	0.350	0.532	0.226	0.000*
Role-play experience -> Initiative and self-direction	0.290	0.188	0.442	0.092	0.000*
Role-play experience -> Leadership and responsibility	0.349	0.236	0.483	0.139	0.000*
Role-play experience -> Productivity and accountability	0.304	0.212	0.434	0.102	0.000*
Role-play experience -> Social and cross-cultural skills	0.465	0.360	0.578	0.277	0.000*

CI: confidence interval.
*$p < 0.001$.

Table 5. Total effects with lower order role-play experience variable.

Path	*B*	CI 2.5%	CI 97.5%	*f*-Square	*p*
Collectivity -> Flexibility and adaptability	0.277	0.087	0.450	0.045	0.003**
Attention -> Social and cross-cultural skills	0.246	0.047	0.412	0.044	0.008**
Goals -> Initiative and self-direction	0.197	0.021	0.375	0.024	0.032*
Action -> Social and cross-cultural skills	0.214	0.013	0.408	0.033	0.034*
Goals -> Social and cross-cultural skills	0.162	−0.003	0.314	0.019	0.048*
Action -> Leadership and responsibility	0.202	−0.012	0.400	0.026	0.056
Goals -> Communication and collaboration	0.160	−0.037	0.339	0.016	0.094
Attention -> Communication and collaboration	0.210	−0.076	0.424	0.027	0.098
Collectivity -> Productivity and accountability	0.175	−0.121	0.405	0.016	0.186
Action -> Initiative and self-direction	0.149	−0.083	0.362	0.013	0.193
Goals -> Productivity and accountability	0.135	−0.088	0.354	0.011	0.226
Collectivity -> Leadership and responsibility	0.129	−0.081	0.385	0.009	0.290
Goals -> Leadership and responsibility	0.091	−0.092	0.264	0.005	0.317
Action -> Flexibility and adaptability	0.076	−0.058	0.248	0.004	0.326
Attention -> Flexibility and adaptability	0.088	−0.087	0.268	0.005	0.328
Collectivity -> Communication and collaboration	−0.130	−0.380	0.144	0.009	0.332
Goals -> Flexibility and adaptability	0.071	−0.088	0.212	0.003	0.350
Action -> Productivity and accountability	0.086	−0.122	0.285	0.005	0.406
Action -> Communication and collaboration	0.079	−0.123	0.281	0.004	0.441
Attention -> Initiative and self-direction	0.100	−0.156	0.354	0.006	0.457
Collectivity -> Initiative and self-direction	−0.085	−0.367	0.204	0.004	0.565
Collectivity -> Social and cross-cultural skills	−0.039	−0.225	0.204	0.001	0.724
Attention -> Productivity and accountability	−0.035	−0.268	0.222	0.001	0.774
Attention -> Leadership and responsibility	0.002	−0.225	0.186	0.000	0.982

CI: confidence interval.
*$p < 0.05$, **$p < 0.01$.

with role-play experience's subscales. In particular, all the role-play experience's subscales were represented in these significant associations, which might indicate that role-play is, above all, a holistic experience when incorporated into a simulation. Hence, splitting it into smaller parts, or even describing only a piece of the experience, may not give a meaningful overview of the whole puzzle. Similarly complex phenomenon is the twenty-first century framework, which further highlights the intricate nature of our findings. Firstly, it is possible that only the specific subscales of role-play experience had an impact on the twenty-first century skills as they represent aspects that the students are not perhaps naturally exposed to in their daily life outside this experience. For example, they might not necessarily have experienced similar collectivity outside of this environment, and hence, this relatively new experience had a higher impact on their skill development. Alternatively, perhaps not all of these dimensions were equally effective in the development of certain skills. For example, while having goals is important when communicating with others, perhaps in this specific learning situation it was not as central. Overall, as our explorative model shows, further research is needed to understand such complex phenomena and their interconnections.

While the *p*-values in the high order model for role-play experience imply positive results in all measured areas of the twenty-first century framework, we cannot fully claim that solely the role-play experience was influencing the attitude formation and skill acquisition. It is possible that a confounding effect existed (Pourhoseingholi et al., 2012), since Me and MyCity day includes many other interactive teaching methods, social dimensions as well as various gamification techniques in addition to role-playing. Furthermore, the small effect sizes need to be reflected upon, since they might indicate limited practical applications of our results. However, effect sizes are always relative, not only to each other but to the field or even more particularly to the specific content and research method (Cohen, 1988). In our exploratory study, we believe that even quite small effect sizes can be rather impactful considering Me and MyCity is only a one-day simulation as part of a much broader pedagogical initiative, in which the majority of Finnish 6th graders take part.

Finally, research has long struggled with identifying the exact attributes or features in gameful and playful activities that facilitate favorable shifts in student attitudes and behavior (e.g., Aura et al., 2022; Wilson et al., 2009). The difficulties derive from the complex structures of games, play, and

learning, where causal relationships are hard or even impossible to distinguish (Wilson et al., 2009). As said, instead of trying to find the exact, beneficial features of these tools, perhaps the key is to look closer at the philosophy of education and gamification: the fundamental idea of making the activity itself fun, meaningful, and engaging, rather than focusing on goal-oriented outcomes and academic benefits. This hedonistic approach to education has been emphasized already by seminal psychologists and educators, such as Montessori and Vygotsky back in the twentieth century (Bodrova, 2003), but is also raised by the current generation of younger people who perhaps expect a high degree of interactivity and engagement in formal education as a result of the popularity of social media, internet, and games (Graafland, 2018). Thus, investing in playful learning experiences and gameful learning environments is seemingly beneficial, as acting in a playful manner is often an intuitive and rather effortless way of learning, be it twentieth or twenty-first century.

Practical implications

In educational practices, multiple challenges exist when striving to integrate twenty-first century learning into classroom activities. Firstly, teachers might not be equipped with an appropriate toolkit, as, for example, a recent study shows how future teachers in Finland are highly interested in teaching twenty-first century skills in the classroom but lack the self-efficacy to do so (Ranta et al., 2022). In addition, teachers might often be short of resources or knowledge of how to integrate twenty-first century learning in traditional schooling, since they might be equipped only with the specific proficiency of teaching a certain academic subject (Liebech-Lien & Sjølie, 2021; Parker & Thomsen, 2019). However, it is important to note that most of the twenty-first century skills, e.g., flexibility, productivity, or adaptability, cannot be considered as separately teachable skills, since in practice, they are always connected to the subject matter (Cavanagh, 2009; Kay & Greenhill, 2011). Lastly, one part of the challenge of integrating twenty-first century learning into curricula might be the lack of proper assessment tools that would accurately measure these complex personal skills (Voogt & Roblin, 2012). Hence, they are not particularly emphasized in national levels of school evaluations, thus not in formal education overall (Ahonen & Kinnunen, 2015).

One answer for tackling these challenges could be separately provided pedagogical services, such as TAT Me and MyCity, which has twenty-first century learning meaningfully integrated into a playful activity. Then again, purchasable programs should not be the cornerstone of public education but equally accessible to all schools and students. Hence, we recommend teachers and other educational practitioners who wish to incorporate educational role-play in their teaching to pursue the creation of holistic, personalized learning experiences, rather than providing stand-alone tasks or one-size-fits-all approaches in classrooms (see also Frykman, 2009; Rodrigues et al., 2021). Through such experiences, it is more probable that individuals with varying goals and social needs, as well as with differing attention allocation and action orientation, are prone to learn new things or shift their existing mindsets (Bowman, 2014). The design of holistic educational role-play is not perhaps straightforward but requires expertise on end-users (i.e., students), methods (i.e., gameful and playful activities), and pedagogy, which teachers nevertheless often possess.

Hence, similar to larp design (Järvelä, 2019), we encourage educational practitioners to establish creative, imaginative, and free spaces to enable play and exploration for students to further expand their existing knowledge and not be too bound by strict rules or instructions on how or what to learn (see also Byl & Hooper, 2013). Furthermore, drawing from the theories of experiential learning (Kolb, 1984) and situated learning (Lave & Wenger, 1991), the opportunities to reflect, reiterate, and explore with peers and instructors should form the basis of gamified and role-play pedagogy. This way, at best, learning environments could facilitate engaging education, where young students are allowed to safely explore new knowledge and discover what role they want to eventually play in this society.

Limitations and further research

As one of the limitations of this study, this research could have benefited from a larger sample size or comparison groups of students not participating in Me and MyCity. The lack of comparison is a common pitfall and raises the discussion on which factors are actually associated and can be proven in one study (Flyvbjerg, 2006). However, as the day in Me and MyCity is authentic and unique, as well as the specific subject content that it covers in terms of economy, society, and work, is not directly required from teachers in the Finnish curriculum, the comparison groups would have not been exactly comparative. Furthermore, since the majority of Finnish 6th graders attend Me and MyCity, comparative peers may have been difficult to recruit. To meaningfully measure the changes, repeated measure design was utilized, which may have some carryover effects, such as subject fatigue, boredom, or practice effects that carry over from the first measuring to the last (Kraska, 2010). To minimize these effects, the order of the survey items was randomized and the survey was designed as short as possible.

Continuing the methodological limitations, it is important to consider whether students' self-reports measure the actual change in their skills and attitudes, and what sort of biases are raised by this method. Self-assessment may be affected by, for example, response and social-desirability bias (Rosenman et al., 2011), or students may understand the wording differently than intended or they might not be capable of assessing themselves accurately. Still, in the lack of an objective measurement tool for this study's purposes, self-reporting was seen as an efficient and effortless way to gather anonymous data which can, in itself, promote truthful responses (see e.g., Warner et al., 2011). Also, as discussed in the previous section, a potential confounding effect (Pourhoseingholi et al., 2012) can be considered as one of the limitations of this study. However, a rather small study

about scarcely researched subject, such as this might bring value to the educational field as well as establish underlying effects already in the early stages of research (Slavin & Smith, 2009).

The data of this study were collected during the Covid-19 pandemic, which affected schooling and students notably in Finland, in terms of remote teaching and hindered well-being. The pandemic-related uncertainties and anxieties may have had an influence on student responses and our results, however, these outcomes remain hard to discern, as the surveys did not track any Covid-related variables. Additionally, as is always a limitation in correlational research, the direct causal influence of only role-play to twenty-first century learning cannot be fully shown. Me and MyCity is a multifaceted learning environment with numerous social and cultural operational layers, which are likely to have an effect on students' experience, not to mention all demographic variables, such as students' socio-economic status, discrepancies in teaching and other unknown matters that influence children's formation of learning, skills, and attitudes. Additionally, with one-day simulation the novelty effect among students is presumably high, hence attending the learning environment continuously or even the second time might not provide such positive results.

Despite its limitations and explorative design, we believe the present paper manages to elucidate the complex phenomena of both twenty-first century learning and role-play-based pedagogy related to and emerging from a unique gamified learning environment. However, such a short treatise of a holistic and multi-layered learning experience with explorative methods requires further investigation. The future expansion of this research aims to examine the role-play and gameful experiences in a more granular and longitudinal manner, revealing perhaps factors of successful role-play in terms of learning. Additionally, qualitative methods, such as interviews and focus groups, could deepen our understanding of a gamified learning environment whilst highlighting children's own views and thoughts. A qualitative approach or a mixed method study might raise youths' potential concerns or reveal novel insights that haven't been considered among researchers or teachers before, thus it is worth pursuing. Overall, more research in the context of holistic playful learning environments and educational role-play should be conducted to examine their possible benefits and detriments compared to education without any role-play or playful experiences. However, we hope this present study serves as a stepping point for scholars and practitioners alike, as well as sheds light on similar, understudied learning experiences that might remain as one of the most memorable days for young learners in their educational path.

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Appendix A. Role-play experience instrument

Action
1. In my role I was able to do many things
2. In my role I was able to decide myself what I was doing (omitted)
3. In my role I had a chance to influence what was happening during the day
Attention
1. I paid attention to different kinds of roles during the day (omitted)
2. I was able to concentrate on my role without any disruptions
3. I became so absorbed in my role that I forgot everything else
Collectivity
1. In my role I was able to do things together with others
2. In my role I felt part of the group
3. During the day the roles felt safe
Goals
1. My role fitted together with my goals
2. My role supported me attaining my goals during the day
3. My role set new goals for me

Appendix B. The values of role-play experience instrument's subscales

Role-play experience instrument's subscale	α	CR	AVE
Action	0.649	0.850	0.739
Attention	0.722	0.878	0.783
Collectivity	0.769	0.867	0.685
Goals	0.782	0.873	0.697