CREATIVITY
Theories—Research—Applications
Vol. 12, Issue 1, 2025
sciendo

The Impact of Creative Educational Climate on the Choreography of Fundamental Movement Sequences

Alexandra Mikó[1], **István Karsai**[2], and **Katalin Kovács**[3]

1 Doctoral School of Education, Eötvös Loránd University, Hungary, ORCID: 0009-0009-8014-6272
2 Sports and Physical Education Center, Medical School, University of Pécs, Pécs, Hungary, ORCID: 0000-0002-9191-8209
3 Institute of Health Promotion and Sport Sciences, ELTE Eötvös Loránd University, Budapest, Hungary, ORCID: 0000-0002-2880-9894

ABSTRACT

Since creativity is considered a key competence in the 21st century, its development deserves special attention in education. Research has shown that the key to fostering creativity lies in the manner in which the teacher creates a classroom environment that encourages it, and the teaching methods employed to deliver the curriculum. Skills related to creativity develop best when student-centered teaching methods are applied. The objective of the present study is to examine the impact of a creative atmosphere and the integration of student-centered approaches on the creativity of university students enrolled in a music-based fundamental movement course. Altogether, 34 university students participated in the elective, music-based fundamental movement course, which was based on Rudolf Laban's movement analysis system. The course lasted 13 weeks, with one 90-minute session per week. The teaching methodology was student-centered. The level of creativity was assessed using the Tóth Creativivty Assessment Scale (Tóth & Király, 2006). The creative learning process was evaluated through fundamental movement sequence (Mikó et al., 2024). Creative climate was surveyed using the School Creative Climate Questionnaire (Péter-Szarka et al., 2015). By the end of the course, significant changes were observed in the complexity ($p < 0.001$), thinking ($p = 0.023$), dominance ($p = 0.013$), and self-actualization ($p = 0.006$) sub-factors. Furthermore, by the end of the course participants had assembled significantly more varied ($p = 0.022$) choreography of fundamental movement. The results of the creative climate questionnaire demonstrate the group's considerable influence in shaping the prevailing climate. In conclusion, our study reveals that even a 13-week course can induce positive changes in creativity.

KEYWORDS:

creativity, fundamental movement, creative climate, student-centered teaching

Article history:

Received: October 15, 2024
Received in revised form: July 17, 2025
Accepted: July 27, 2025

ISSN 2354-0036
DOI: 10.2478/ctra-2025-0006

Corresponding author at:

Alexandra Mikó
E-MAIL: szancsoo@gmail.com

INTRODUCTION

At the end of the twentieth century, it was acknowledged in the labor market that managing escalating social and economic changes demanded flexibility and continuous innovation, and creativity was identified as the key solution to these challenges (Péter-Szarka, 2012). It is no coincidence that creativity, as a key competence, has gained increasing significance in education in the 21st century (Partnership for 21st Century Skills, 2009, as cited by Szettele, 2020). If the goal is to cultivate creativeness, the establishment of an appropriate classroom environment plays a crucial role (Beghetto & Kaufman, 2014).

Numerous education professionals have attempted to identify the classroom factors that enhance creativity (Davies et al., 2013). Compared to traditional education, developing ingenuity and establishing a creative environment require different methods and approaches (Morris, 2006). To be effective, educators must teach or inspire inventiveness in a creative manner. Resourceful teaching encompasses the teacher's imaginative, engaging, and attention-grabbing pedagogical practices, which make learning attractive, exciting, and effective. It also includes teaching models, strategies, and methods that promote creativity (Morris, 2006; Lin, 2011).

In order to achieve creative learning, it is essential for teachers to strive to provide opportunities for students to become active participants in their own learning process. Active learning is often referred to as a student-centered approach (Bánfi & Korom, 2022), which requires the application of methods and techniques that change the roles of the teacher and students in the classroom compared to traditional methods (Keiler, 2018, as cited by Bánfi & Korom, 2022).

In the applied method, the teacher assumes a facilitator role, where the primary focus is not on delivering knowledge but on assisting students in solving tasks.

Vass (2012) emphasizes group work, debate, play, exploration, discovery, and project-based methods as essential for encouraging creativity. In addition, research highlights the use of open-ended questions (Horng et al., 2005) and the cooperative method (Baloche, 2005) in the classroom. The effectiveness of cooperative methods is closely linked to the quality of collaboration with peers. Supporting autonomy is also a key aspect of student-centered education, as it contributes to increasing students' motivation (Richards & Levesque-Bristol, 2014), which is essential for improving creative processes (Amabile, 1996).

For the development and improvement of student creativity, more is required than the application of a few tutoring techniques and methods; the entire teaching style and classroom climate must be permeated by an attitude that supports ingenuity (Péter-Szarka et al., 2015). A creative teacher should be friendly, open, and inclusive, listen to the children's needs, and be aware of their abilities. It is important to strive to create a classroom atmosphere where students are not afraid to express and share their thoughts; one that inspires imagination and values collaboration among students (Cameron, 2010, cited in Al-Dababneh et al., 2017). Considering the points discussed above, it can be stated that the role of teachers is complex and filled with challenges (Cropley,

1999). According to Torrance and Myers (1970, cited in Fryer, 2009), promoting creativity in education requires highly skilled teaching.

In terms of fostering a creative climate, higher education also deserves special attention, as universities represent the final stage where the development of creativity can be realized within institutional frameworks. Furthermore, physical education courses offered at universities can also be considered in relation to creativity, as several studies have reported positive effects of physical activity on creativity (Blanchette et al., 2005; Colzato et al., 2013; Santos et al., 2016, cited in Ruiz-Ariza et al., 2017). Numerous researchers have investigated the effects of musical movement forms and dance, with most results reporting positive changes in cognitive and creative abilities (Minton, 2003; Cheung, 2010, cited in Pürgstaller, 2020). Lai Keun and Hunt (2006) describe how creativity can be fostered through dance by providing students the opportunity to independently solve certain situations and allowing them to explore the potential of movement: experimenting, improvising, composing, and choreographing with learned movement material. Most creativity-enhancing dance programs are based on Rudolf Laban's movement analysis system (LMA; see e.g., Lykesas, 2020; Neville & Makopoulou, 2020; Thomaidou et al., 2021). According to Langton (2007), LMA provides a framework that can be applied to various forms of movement and can assist not only students but also teachers and movement professionals in creative design (Lavin, 2008; Pignitzkyné Lugos & Lévai, 2014; Mikó & Kovács, 2021).

To the best of our knowledge, there are only a few studies in the Hungarian and international literature that have examined the effects of music and the creative climate on university students. The aim of this research is to investigate whether the effects of a creative climate and student-centered teaching methods can be observed after one semester of an elective musical fundamental movement course in higher education.

Questions

1. Is there a change in creativity test scores and in the variety of fundamental movement sequences as a consequence of the creative climate?
2. Do the results of the creative climate questionnaire serve as confirmation of the positive effects of a creative environment?
3. Is the Instrument to Measure the Variability of Fundamental Movement Choreography applicable in an intervention setting?

Sample

A total of 34 participants (female = 33, male = 1) enrolled in the elective course offered in one of the largest universities in Budapest, Hungary. The average age of the participants was 20.41 years. All of the students who enrolled in the course had a background in dance or aesthetic sports.

Creative musical fundamental movement course—Investigation protocol

The 13-week (90 minutes once a week) course was based on fundamental movement (FM), as Seeling (2012, cited in Papaleontiou-Louca et al., 2014) suggests that in order to be creative, one must

possess fundamental knowledge and deep expertise as a starting point. FM serves as the alpha and omega of all movement, and it has been a part of every Hungarian student's weekly routine during primary and secondary schools, providing a foundational knowledge to design and assemble creative movement routines. During the course, we introduced another perspective on FM for the students: we asked them to redesign the usual warm-up practice utilizing various FM elements (e.g., walks, jumps, mixed arm positions, descents, ascents, etc.) as building blocks of a choreography, as pieces of a puzzle. A description of the course is provided in the first annex. The course was divided into three blocks. The first block focused on acquiring the foundational knowledge necessary for later planning, that is, reviewing the movement material of FM. In the second block, the LMA was employed to integrate a composition a movement sequence into a choreographic work. The third block focused on assembling several choreographies based on the knowledge gained.

In terms of teaching methods, tasks were given that encouraged exploration, experimentation, and the stimulation of imagination (e.g., free movement in space in various directions and levels). Collaboration with peers and offering choices (e.g., selecting music freely, choosing group members, and deciding whether or not to use props during the exercises) was also encouraged. The theoretical sessions were conducted through guided discussions and open-ended questions (e.g., „When can we call a fundamental movement routine a dance?").

The level of creativity was assessed using the „Tóth Creativity Assessment Scale" (Tóth & Király, 2006) at the beginning and end of the course. The result of the creative learning process was measured by a student-designed FM sequence, where changes in movements in space, body parts etc. were compared. Students were required to individually assemble a 4x8 bar FM sequence during the first and last sessions of the course. Participating students were given clear guidance before the design exercise. The set of criteria instruments was presented and subsequently utilized to evaluate the series of exercises (see Table 1). Students had approximately 15–20 minutes to complete the task. The completed movement sequences were recorded on video for investigation. At the end of the course, the students were asked to complete the „School Creative Climate Questionnaire" (Péter-Szarka et al., 2015) to measure the extent of the creative climate.

MEASUREMENT TOOLS

Tóth's Creativity Assessment Scale:

Given Lin's (2011) focus on the development of creative processes in education, we looked for a suitable measurement tool. For the evaluation of abilities related to ingenuity, Tóth's Creativity Assessment Scale (TCAS; see Tóth & Király, 2006) was used, as it was specifically designed for older students and has been applied in several domestic studies (Szabó, 2015; Dominek & Czeglédi, 2021; Némethné Tóth et al., 2023). The TCAS requires respondents to assess 72 statements, which represent various aspects of personality related to creativity across 12 dimensions: complexity, curiosity, thinking, originality, energy, perseverance, playfulness, impatience, self-assertion, nonconformity,

dominance, and risk-taking. The scale aims to identify 12 personality traits that reflect components essential to the creative process based on individuals' everyday behavior. The Creativity Assessment Scale has proven to be a reliable tool, applicable in pedagogical practice, providing a solid foundation for evaluating and fostering students' creative abilities (Tóth & Király, 2006).

Instrument to Measure the Variability of Fundamental Movement Choreography

According to Rusch et al. (1964), a more valid approach to measuring creativity involves motor skill tests, so they were also incorporated into the study. Creative thoughts and ideas can be expressed not only in a cognitive way, but also through the movement of the body, and this is the form of expression that the various motor creativity tests were developed to investigate. As with verbal and visual methods, the tests are based on measures of divergent thinking (fluency, flexibility, originality). Most of the tasks ask participants to move in different ways in a given space, to move an object from point A to point B, or to represent the movement of an animal/object/phenomenon. They observe the pace at which ideas flow (fluency), the number of solutions to a given problem (flexibility), and the uniqueness of the solution (originality; see Lee et al., 2023). The issue of subjectivity frequently emerges in the context of creativity tests (Mező & Mező, 2022). Consequently, a motor-based scoring system was developed, offering an objective assessment of potential changes in creative processes through the design of a FM sequence.

The evaluation system was established based on LMA, the structural elements of FM, and a scoring system was developed from various aesthetic sports (e.g., gymnastics, aerobics, figure skating). This process led to the definition of seven evaluation criteria: exercise timing, level changes, directions, asymmetric positions, locomotor movements, use of equipment, and tempo variations (see Table 1). The finalized criteria and corresponding scores for each item were differentiated based on preliminary measurement results (Mikó & Kovács, 2021).

Table 1. Criteria for the evaluation of fundamental movement sequences (Mikó et al., 2024)

Items	Scores
4 bars exercise sequence	1
2 bars exercise sequence	2
Changes of level	2
Asymmetric simple positions	1
Asymmetric complex direction	2
Change of direction	2
Change of place	2
Device use	2
Music use	2
Change of pace	2

Usefulness of a measurement tool lies in its ability to identify, quantify, and assess the phenomenon being measured. To ensure these conditions are met, measurement tools and methods must comply with various validity and reliability tests (Starko, 2018). In this regard, we also conducted an evaluation of the validity of our assessment criteria (Mikó et al., 2024). Five independent experts (physical education teachers) were asked to evaluate three 32-count exercise sequences of varying difficulty, designed by university students. During the internal consistency analysis, we obtained results exceeding the expected threshold (0.7) for all three exercise sequences (Cronbach's α: 0.964, 0.992, and 0.990), indicating a strong correlation among the evaluators' scores. The Intra-Class Correlation (ICC) results showed that the evaluators' scores for all three exercise sequences exceeded the suitability threshold (0.81) with statistical significance ($p < 0.05$).

The measurement tool has not yet been tested in an intervention setting; therefore, this study also aims to examine its applicability in such a context.

School Creative Climate Questionnaire

At the end of the course, participants were asked to complete the School Creative Climate Questionnaire (Péter-Szarka et al., 2015). It evaluates aspects such as the degree of acceptance among students, the presence of a supportive and cooperative atmosphere (group subfactor); encouragement of innovative solutions (openness subfactor); the teacher's promotion of diversity, risk-taking, and tolerance for uncertainty (encouragement subfactor); whether the teacher presents challenges, emphasizes the meaningfulness of tasks, and fosters long-term motivation for task execution (challenge subfactor); and whether students feel restricted in expressing their thoughts (constraints subfactor).

Participants rated how characteristic each statement was of their classroom environment on a scale from 1 to 7 (1 = not characteristic at all, 7 = fully characteristic). The average score of the items within each subscale indicated the participants' perception of their learning environment.

Statistics

We applied a paired *t*-test to analyze the input and output results. In addition to basic statistical measures (mean and standard deviation), the Shapiro-Wilk test was used to assess normality. Depending on the normality test results, the findings were interpreted using either the Student's *t*-test and/or the Wilcoxon test. The significance level was set at $p < 0.05$. Effect size was evaluated using Cohen's d analysis. To assess the internal consistency of the input and output results, Cronbach's α coefficient was employed. Correlation analysis was conducted for the creativity and creative climate sub-factors using Pearson's correlation method. All calculations were performed using the JASP 0.18.3.0 software package.

RESULTS

Creativity

The results of the internal consistency analysis are illustrated in Tables 2 and 3.

Table 2. Testing the internal consistency of TCAS input results (own editing)

Sub-factors	Cronbach's *α*
Nonconformity	0.615
Complexity preference	0.598
Risk tasking	0.619
Independent thinking	0.625
Impatience	0.644
Assertiveness	0.572
Dominance	0.610
Curiosity	0.588
Activity	0.578
Originality	0.624
Persistance	0.617
Playfullness	0.657

The overall internal consistency score showed a medium strength value (Chr α = 0.634). The inter-rater reliability value between sub-factors was also examined, and the indicators of these results are shown in Table 2. For most sub-factors, the scores were also medium strength, but for complexity, self-actualization, curiosity and energy showed a value lower than 0.6, indicating a weak internal consistency.

We also performed reliability testing on the output TCAS scores.

Table 3. Testing the internal consistency of TCAS output results (own editing)

Sub-factors	Cronbach's *α*
Nonconformity	0.643
Complexity preference	0.507
Risk tasking	0.610
Independent thinking	0.623
Impatience	0.653
Assertiveness	0.560
Dominance	0.631
Curiosity	0.619
Activity	0.612
Originality	0.612
Persistance	0.663
Playfullness	0.648

For the outcome results, the overall internal consistency score was found to be of medium strength (Chr $\alpha = 0.640$), similar to the input measurement results. Also, we looked at the inter-rater reliability indices between sub-factors (Table 3), and for the outcome measures, only the complexity and self-validation scores were below the medium strength level.

The difference between the initial and outcome results of the intervention, as measured by the TCAS, is presented in Tables 4 and 5.

Table 4. Results of TCAS (own editing)

Results of TCAS				
	Pre		Post	
Sub-factors	*M*	*SD*	*M*	*SD*
Nonconformity	8.91	4.26	8.59	4.39
Complexity preference	14.65	3.46	20.56	7.41
Risk tasking	12.47	5.39	11.06	4.80
Independent thinking	13.24	3.36	14	3.43
Impatience	11.94	4.72	11.71	4.8
Assertiveness	12.50	4.17	18.91	9.5
Dominance	10.56	4.92	11.50	5.09
Curiosity	16.26	3.86	15.85	4.16
Activity	13.82	5.01	13.85	4.39
Originality	13.29	2.59	13.91	2.85
Persistance	14.35	4.75	14.17	4.73
Playfullness	17.68	4.60	17.85	4.96
Total creativity	152.5	26.84	171.97	28.70

The results demonstrate that changes were observed not only in overall creativity, but also in the individual sub-factors. As illustrated in Table 5, while the highest scores were recorded for playfulness in the initial measurement, the second measurement indicated that students exhibited higher scores for complexity and assertiveness. The end sub-factors exhibited the most notable change in the descriptive statistics.

Table 5. Comparative analysis of the TCAS results of the investigation and control groups after intervention (own editing)

	Test	Statistic	*p*	Effect size
Nonconformity	Student	0.665	0.511	0.113
Complexity preference	Student	-4.405	< .001	0.259
Risk tasking	Student	2.190	0.036	0.129
Independent thinking	Student	-2.377	0.023	0.099
Impatience	Wilcoxon	155.000	0.849	0.225

	Test	Statistic	*p*	Effect size
Assertiveness	Wilcoxon	116.000	0.006	0.200
Dominance	Student	-2.628	0.013	0.075
Curiosity	Student	0.796	0.432	0.129
Activity	Student	-0.049	0.961	0.126
Originality	Student	-1.259	0.217	0.182
Persistance	Wilcoxon	159.500	0.796	0.229
Playfullness	Wilcoxon	164.500	0.562	0.217
Total creativity	Student	-4.889	< .001	0.166

During the statistical analysis, 33 degrees of freedom ($df = 33$) were determined, based on the number of participants and the type of test applied. The results of the paired t-test demonstrated statistically significant changes in complexity ($p < 0.001$), risk-taking ($p = 0.036$), thinking ($p = 0.023$), assertiveness ($p = 0.006$), dominance ($p = 0.013$) and total creativity ($p < 0.001$). Despite the *p*-values being lower than the expected significance level, the effect size did not indicate a significant difference.

Fundamental movement sequence

We also looked at the internal consistency of the input and output results for the FM sequences (Tables 6 and 7). The results for the items "4-bars exercises," "2-bars exercises," and "use of equipment" did not allow for the calculation of internal consistency (as these items were not used by the participants in the input measurement), so we only performed the analysis for the other items.

Table 6. Examining internal consistency in the input results of fundamental movement sequence (own editing)

Sub-factors	Cronbach's *α*
Change of level	0.630
Asymmetric Simple positions	0.639
Asymmetric Complex positions	0.586
Change of Direction	0.581
Change of Place	0.598
Music use	0.646
Change of Pace	0.590

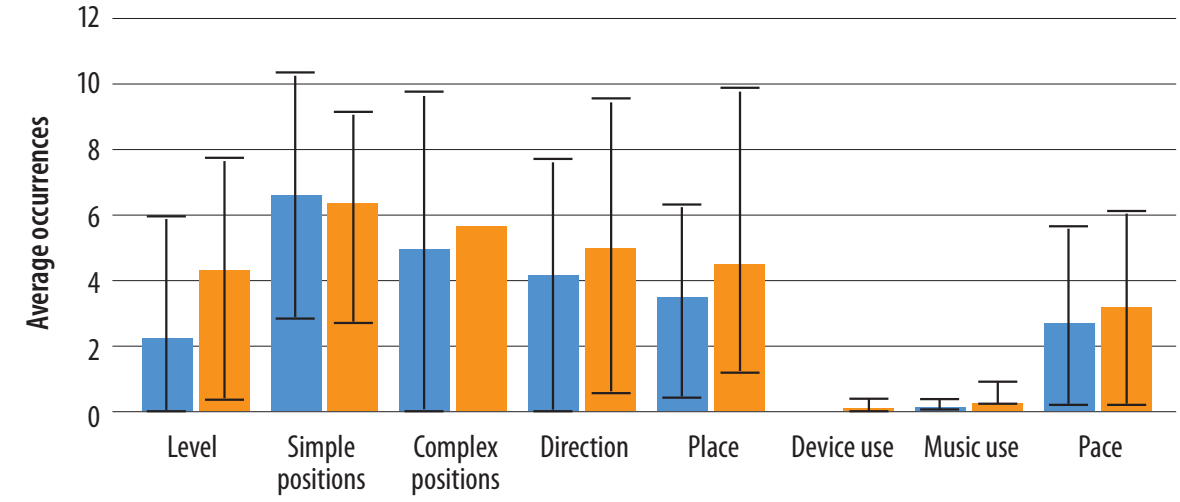
The overall internal consistency for the input results of movement chains showed a moderate strength value (Chr $\alpha = 0.635$). The inter-item reliability test (Table 6) showed results below the desired level (0.6) for several items, such as asymmetric complex situations, change of direction, change of position and bars.

Table 7. Examining internal consistency in the output results of fundamental movement sequence (own editing)

Sub-factors	Cronbach's *α*
Change of Level	0.633
Asymmetric Simple positions	0.648
Asymmetric Complex positions	0.563
Change of Direction	0.553
Change of Place	0.593
Device use	0.641
Music use	0.630
Change of Pace	0.607

For the outcome results of the FM sequence, the overall internal consistency also showed a value of medium strength (Chr $\alpha = 0.635$). During the end-of-semester sequences, students were already using devices, so it was possible to carry out an internal consistency check for this item. We also performed a test of inter-item reliability among the outcome measures (Table 7), and the present results in this case showed values below the medium strength (0.6) for three items: the asymmetric composite position, the change of direction, and the change of position items.

A comparison of the results of the designed FM sequences at the beginning and end of the program are illustrated in Figure 1 and Table 8. The FM sequences were assessed according to the evaluation system (Table 1). In the designed FM sequences, the quality of the execution of the exercises was not the determining factor; rather, it was the number of items that the student could apply during the movements. It was therefore considered that the more items that were applied during a movement, the more varied and creative the routine would be.



	Level	Simple positions	Complex positions	Direction	Place	Device use	Music use	Pace
Pre.	2.53	6.74	4.65	4	3.44	0	0.06	2.94
Post.	4.12	6.12	5.71	5.24	4.71	0.06	0.24	3.24

Figure 1. Occurrence of fundamental movement items (own editing)

In the current statistical analysis, a total of 33 degrees of freedom ($df = 33$) were established. The paired t-test showed that, by the end of the course, students scored higher in terms of overall score (i.e., they had created more varied FM sequences). On average, students changed levels more often, used asymmetric positions more frequently, and changed direction, positions and pace more often at the end of the program.

Table 8. Comparative analysis of the occurrence of fundamental movement items of the investigation and control groups after intervention (own editing)

	Test	Statistic	*p*	Effect size
Change of level	Wilcoxon	100.000	0.037	0.228
Assymetric simple positions	Student	0.864	0.394	0.213
Assymetric complex positions	Student	-1.083	0.287	0.208
Change of direction	Wilcoxon	101.500	0.100	0.225
Change of place	Student	-1.743	0.090	0.235
Music use	Wilcoxon	4.000	0.182	0.425
Change of pace	Student	-0.549	0.587	0.217
Total score	Student	-2.477	0.031	0.194

A paired t-test was also performed on each item to determine whether a significant change was found. The test showed a significant difference for the level change item ($p = 0.037$) and the total scores ($p = 0.031$). As with the creativity test subfactors, the effect size did not demonstrate a significant difference on the movement sequences sub-factors.

Creative climate

At the final stage of the study, the participants completed the School Creative Climate Questionnaire (Péter-Szarka et al., 2015). The results of the internal consistency analysis of the Creative Climate Questionnaire results are illustrated in Table 9.

Table 9. Examining internal consistency in the results of the Creative Climate Questionnaire (own editing)

Sub-factors	Cronbach's *α*
Group	0.858
Openness	0.816
Encouragement	0.814
Challanges	0.794
Barriers	0.837

The overall internal consistency showed a value of 0.854, indicating good reliability. The analysis between sub-factors also yielded results higher than the expected value (0.7), so the consistency of the items was found to be adequate.

The results of the descriptive statistics are illustrated in Figure 2. Students rated the extent to which each statement applied to the lessons on a scale from 1 to 7 (1 = not at all, 7 = completely).

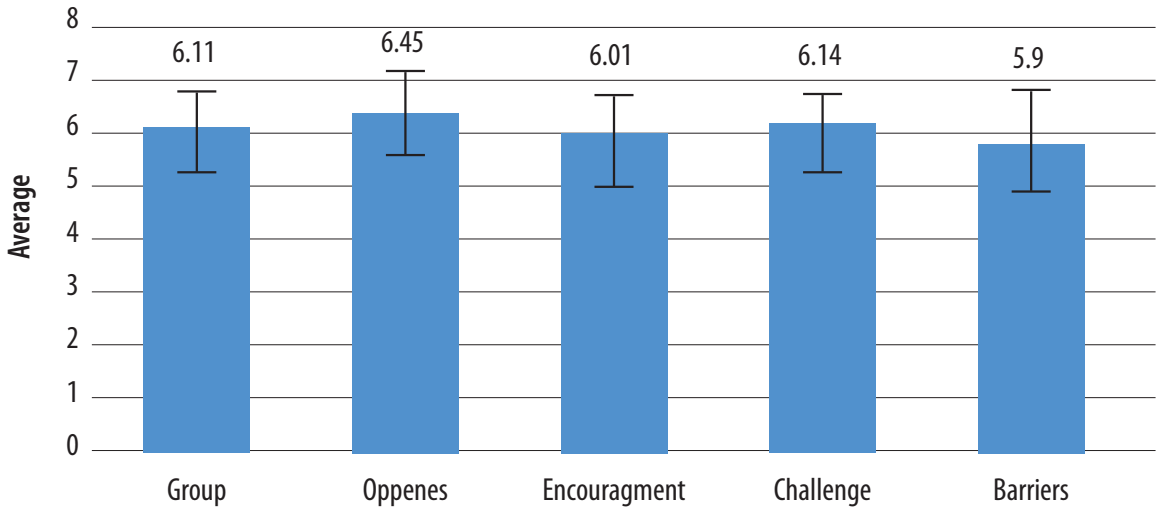


Figure 2: Results of the Creative Climate Questionnaire (own editing)

On average, the questions for each sub-factor were rated by the participants with a number 6, with the highest score being given to 'openness.' The objective was to ascertain whether there was a correlation between the creative climate sub-factors and TCAS scores, for which a correlation matrix was used.

Table 10. Correlation between the results of the creative climate questionnaire and the TCAS (own editing)

Creative Climate		
Creativity sub-factor	***r***	***P***
Nonconformity	-0.284	0.104
Complexity preference	0.209	0.237
Risk tasking	0.318	0.067
Independent thinking	0.015	0.932
Impatience	0.019	0.917
Assertiveness	0.088	0.619
Dominance	0.022	0.900
Curiosity	0.397	0.020
Activity	0.367	0.033
Originality	0.448	0.008
Persistence	0.250	0.153
Playfulness	0.191	0.280
Total creativity	0.324	0.061

The results demonstrate that despite the group sub-factor not being identified as the most dominant factor within the creative climate questionnaire, a positive correlation was observed with three sub-factors: curiosity, energy and originality.

SUMMARY

The present study investigated the effects of a 13-week elective music fundamental movement course on creativity among university students. Creativity is a personality trait of particular importance in the 21st century, and the university represents the final stage at which creativity can be developed within an institutional setting. Physical education courses at the university level offer an optimal setting for fostering creativity.

Given the existing literature on the beneficial effects of musical movements on creativity, we developed a novel course that integrates musical FM according to LMA. In order to foster creativity, we placed particular emphasis on establishing a conducive learning environment and employed student-centered methods to guide the curriculum.

Taking the existing literature into account, we hypothesized that there would be a significant difference in creativity at the end of the study as a result of the creative climate. The change in creativity levels was measured using the TCAS. At the end of the intervention, there was a significantly higher overall level of creativity and positive changes in each sub-factor (complexity, independent thinking, assertiveness, dominance). The complexity sub-factor refers to the reception of stimuli that diverge from the norm (Tóth & Király, 2006). As outlined in the course structure, students were encouraged to move beyond their previous experience of fundamental movement as a warm-up exercise. It is our belief that by approaching the movement material from an alternative perspective, our program has inspired new stimuli and perspectives in the participants. The independent thinking sub-factor refers to the tendency of individuals to strive for solutions, seeking new ways to solve a given problem (Tóth, Király, 2006). The observed increase in this sub-factor can be explained by the fact that students were required to expand the existing choreography along another item of the LMA. The planning process was not constrained by a tight time limit, allowing students to engage in a comprehensive and thoughtful approach to the tasks at hand. The sub-factor of confidence (Tóth & Király, 2006) refers to the need for individuals to embrace their own ideas that are different from the usual ones. Throughout the program, students were encouraged to express their own ideas in the presence of their peers, and this encouragement may have facilitated an enhancement in assertiveness. The dominance subfactor, defined as the acceptance of novel ideas by others (Tóth & Király, 2006), corroborates the previous assumption. Interestingly, the risk-taking sub-factor was significantly lower at the end of the program. It requires individuals to be aware that their ideas may fail in some cases (Tóth & Király, 2006). Throughout the program, students were consistently encouraged to propose more unconventional ideas, with the understanding that there is no incorrect solution. This may have contributed to an increase in

participants' confidence, leading to a reduced sense of risk associated with proposing new ideas. The TCAS was first published in 2006, and since that time, studies have been conducted in Hungary using this measure to estimate creativity levels. Dominek and Czeglédi (2021) concluded that creativity, as a competence, must be developed in university students. Némethné Tóth (2023) investigated the impact of student-centered teaching methods on the creativity of primary school students in PE. By the end of the study, no improvement in creativity was evident, but a limitation of the research is that the outbreak of the Covid virus forced teaching into the online space. To the best of our knowledge, no similar study has been conducted with university students.

The impact of the creative climate was also measured through a movement task. A 32-bars movement sequence was designed by the students at the beginning and at the end of the course and the FM sequence was assessed using our proprietary instrument. By the end of the course, the students had created significantly more varied and creative movement sequences, which was reflected in the fact that they used certain items (tempo change, change of position, change of level, etc.) more often. We believe that LMA and the new approach to FM have had a significant impact on these positive developments.

The results of the creative climate questionnaire indicated that a creative climate was established in the classroom. The highest score was for openness, indicating that students perceived the lessons to be characterized by collaboration, teacher encouragement for novelty and diversity of perspectives, and that the course was challenging within appropriate limits. Based on the results of the School Creative Climate Questionnaire, the Group sub-factor was not rated as the strongest. Conversely, a positive correlation was observed between the three sub-factors (curiosity, activity and originality). The correlation demonstrates that the stronger the group cohesion, the greater the level of curiosity exhibited by students. It is widely accepted that curiosity is a significant factor in creative thinking. Furthermore, it necessitates a considerable degree of energy from the students, which can be effectively cultivated in a positive and supportive group environment. Additionally, a correlation was identified between the group sub-factor and originality, which may indicate that increased team cohesion is associated with a greater capacity for creative and original ideas among group members. The findings of the correlation matrix indicate that collaborative tasks play a notable role in fostering a creative atmosphere.

Internal consistency checks were carried out for the input and output measurements. Although the TCAS and Creative Climate Questionnaires have been shown to be reliable and valid (Tóth & Király, 2006; Péter-Szarka et al., 2015), for our present study sample, the reliability of the measures showed only moderate results in most cases. The moderate effect size can be explained, among other things, by the small size of the study sample, which makes it worthwhile to conduct the study with a larger number of students in the future.

The Instrument to Measure the Variability of Fundamental Movement Choreography was tested in this study for the first time in an intervention setting. Statistically, internal consistency has not reached the required level of reliability for several items, so it is worth testing on a higher number of samples in the future and adjusting the items of the instrument. Although significant results

were obtained for several sub-factors, both for the creativity test and for the movement instrument the effect size statistical analysis did not show any significant change. While the significances show that movement, combined with music, plays an important role in complex and versatile creativity development, the effect size indicates that a duration of 13 weeks is not adequate for achieving substantial development. This suggests that creativity development should be a continuous process throughout the school years.

LIMITATIONS

One limitation of the research is that no control group was established, which could significantly affect the validity of the results. In its absence, it is not possible to clearly distinguish the effects under investigation from other possible factors, so that increased caution is required when interpreting the results.

Another limitation is that, at the University, class attendance is compulsory. However, absences from 25% of the classes (i.e., a total of 3×90 minutes of class time) are allowed. As a limitation, there have been students who have missed some sessions.

The existing literature contains a number of references to the beneficial effects of learner-centred teaching methods and dance-music movement-based program on creativity. In the present study, a combination of the two approaches was employed; however, the impact of the learner-centred teaching method and dance-music on creativity was not measured separately. In the future, it would be beneficial to examine the effects of these two factors on creativity separately in order to compare the potential differences.

CONCLUSION

In summary, our study shows that the positive impact of learner-centered methods on thinking can be demonstrated even after a 13-week program, but long-term results can only be achieved through continuous creative teaching (Beghetto & Kaufman, 2014). The university provides an excellent environment for the implementation of learner-centered methodologies, which are particularly well-suited to this age group, offering benefits not only in the classroom but also in various physical education courses. Choreographed movement forms offer teachers a unique opportunity to foster creativity, particularly when accompanied by music. It is crucial for educators to possess the optimal tools to assess the efficacy of their pedagogical practices. In order to achieve this, we have developed an instrument that provides objective feedback on creative learning processes through the design of movement sequences (Mikó et al., 2024). We recommend the use of the scoring system and the associated procedure not only to teachers, but also to coaches and sports

professionals who consider the development of creativity in their sessions to educate participants and want to be sure of the results of their work.

It is important to note that the study was conducted without a control group, which limits generalizability of the findings to other populations or educational contexts. In the absence of a control group, it is not possible to rule out the influence of alternative factors—such as the voluntary nature of course participation or participants' pre-existing motivation—on the observed outcomes. Therefore, the results should be interpreted as indicative trends rather than as evidence of causal relationships. In future research, the present study's methodology will be replicated with a control group in order to provide a more valid approach to the results, and also with a larger sample size.

References

Al-Dababneh, K.A., Al-Zboon, E.K. & Ahmad, J. (2017). The creative environment: teachers' perceptions, self-efficacy, and teaching experience for fostering children's creativity. *Early Child Development and Care*, *189*(10), 1620–1637. https://doi.org/10.1080/03004430.2017.1400969

Amabile, T.M. (1996). *Creativity in context: Update to the social psychology of creativity*. Boulder, CO.

Baloche, L. (2005): Developing cooperative contexts for creativity. In D. Shepherd (Ed.), *Creative Engagements: Thinking with children* (pp. 53–60). Inter-Disciplinary Press.

Bánfi, G., Korom, E. (2022). Tanulói aktivitásra alapozott oktatási módszerek alkalmazásának vizsgálata általános és középiskolai tanárok körében. *Iskolakultúra*, *32*(10), 3–21. https://doi.org/10.14232/iskkult.2022.10.3

Beghetto, R.A. & Kaufman, J.C. (2014). Classroom contexts for creativity. *High Ability Studies*, *25*(1), 53–69. https://doi.org/10.1080/13598139.2014.905247

Cropley, A.J. (1999). Education. In M.A. Runco & S.R. Pritzker (Eds.), *Encyclopedia of Creativity*, vol 1(A-H) (pp. 629–642). Academic Press.

Davies, D., Jindal-Snape, D., Collier, C., Digby, R., Hay, P. & Howe, A. (2013). Creative learning environment in education—A systematic literature review. *Thinking Skills and Creativity*, *8*, 80–91.

Dominek, D.L., & Ceglédi, S. (2021). Alkoss—a találékonyság pszichológiája! Kreativitás mint képességvizsgálat a Tóth-féle kreativitás becslő skála segítségével a nemzeti közszolgálati egyetem hallgatóinak körében. *Magyar Pedagógia*, *121*(4), 395–407. https://doi.org/10.17670/MPed.2021.4.395

Fryer, M. (2009). Promoting creativity in education and the role of measurament. In E. Villalba (Ed.), *Can creativity be measured? International Conference volume. Directorate-General for Education and Culture, Centre for Research on Lifelong Learning* (pp. 327–336). European Union.

Horng, J., Hong, J., ChanLin, L., Chang, S., & Chu, H. (2005). Creative teachers and creative teaching strategies. *International Journal of Consumer Studies*, *29*(4), 352–358. https://doi.org/10.1111/j.1470-6431.2005.00445.x

Jeffrey, B. (2006). Creative teaching and learning: Towards a common discourse and practice. *Cambridge Journal of Education*, *36*(3), 399–414.

Lai Keun, L. & Hunt, P. (2006). Creative dance: Singapore children's creative thinking and problem-solving responses. *Research in Dance Education*, *7*(1), 35–65. https://doi.org/10.1080/14617890600610661

Langton, T.W. (2007). Applying Laban's Movement Framework in Elementary Physical Education. *Journal of Physical Education, Recreation & Dance*, *78*(1) 17–53. https://doi.org/10.1080/07303084.2007.10597954

Lavin, J. (2008). *Creative Approaches to Physical Education—Helping children to achive their true potential*. Routledge, Taylor & Francis Group.

Lee, Y., Iodice, P., & Komar, J. (2023). Creativity Is Contextual: A Narrative Review of Motor Creativity Tests From an Ecological Perspective. *Motor Control*, 27, 717–735. https://doi.org/10.1123/mc.2022-0092

Lin, Y. (2011). Fostering Creativity through Education—A Conceptual Framework of Creative Pedagogy. *Creative Education*, *2*(3), 149–155. https://doi.org/10.4236/ce.2011.23021

Lykesas, G., Chatzopoulos, D., Koutsobua, M., Styliani, D., Bakirtzoglou, P. (2020)

Mező, K. & Mező, F. (2022). A hazai kreativitáskutatás trendjei, főbb vizsgálati kérdései. *Alkalmazott Pszichológia*, *22*(2), 21–34. https://ap.elte.hu/wp-content/uploads/2023/01/AP_2022_2-03-Mezo-Katalin-Mezo-Ferenc.pdf

Mikó, A. & Kovács, K. (2021). Lábán Rudolf mozgáselemző rendszer hatékonysága gimnasztikai gyakorlatsor összeállításánál. In Zs. Gősi, B. Boros, & M. Magyar (Eds.), *Sport a Covid-19 pandémia árnyékában* (pp. 65–78). Akadémiai Kiadó.

Mikó, A., Karsai, P., & Kovács K. (2024). Validation of an Instrument to Measure the Variability of Fundamental Movement Choreography. *Neveléstudomány: Oktatás, Kutats, Innováció*, *12*(4), 5–16.

Morris, W. (2006). *Creativity. Place in Education*. https://www.creativejeffrey.com/creative/Creativity_in_Education.pdf

Neville, R. & Makopoluo, K. (2020). Effect of a six-week dance-based physical education intervention on primary school children's creativity: A pilot study. *European Physical Education Review*, *27*(1), 203–220. https://doi.org/10.1177/1356336X20939586

Némethné Tóth, O., H. Ekler, J., Koltai, M., & Pachner, O. (2023). A tanulók kreativitásának változása pályakezdő testnevelő tanárok módszertani mentorprogramjának (MIP-NPET) eredményeként. In. Zs. Gősi & M. Magyar (Eds.), *A tanuláás-tanítás folyamatának sajátossága sport(os) nézőpontból*. Akadémia Kiadó.

Papaleontiou-Louca, E., Varnava-Marouchou, D., Mihai, S., & Konis, E. (2014). Teaching for Creativity in Universities. *Journal of Education and Human Development*, *3*(4), 131–154. https://doi.org/10.15640/jehd.v3n4a13

Péter-Szarka, Sz. (2012). Creative climate as a means to promote creativity in the classroom. *Elektroniv Journal of Researh in Educational Psychology*, *10*(3), 1011–1034.

Péter-Szarka, Sz., Timár, T., & Balázs, K. (2015). *Az iskolai kreatív klíma kérdőív. Alkalmazott Pszichológia*, *15*(2), 107–132.

Pignitzkyné Lugos, I. & Lévai, P. (2014). *A tánc és a kreatív mozgás alapjai*. Magyar Diáksport Szövetség.

Pürgstaller, E. (2020). Assessment of Creativity in Dance in Children: Development and Validation of a Test Instrument. *Creativity Research Journal*. https://doi.org/10.1080/10400419.2020.1817694

Richards, K.A.R., & Levesque-Bristol, C. (2014). Advocacy in action: Student learning and motivation in physical education. *Strategies*, *27*(2), 43–46.

Ruiz-Ariza, A., Suárez-Manzano, S., López-Serrano, S., & Martinez-López, E.J. (2019). The effect of cooperative high-intensity interval training on creativity and emotional intelligence in secondary school: A randomised controlled trial. *Europen Physical Education Review*, *25*(2), 355–373. https://doi.org/10.1177/1356336X17739271

Rusch, R.R., Denny, D.A., & Ives, S. (1964). The development of a test of creativity in the dramatic arts: a pilot study. *J- educ. res*, *57*, 250–254,

Starko, A.J. (2018). *Creativity in the Classroom. Schools of Curious Delight*. Routledge.

Szabó, J. (2015). A felsőoktatási tehetségfejlesztés hallgatóinak vizsgálata a tudományos kreativitás tükrében. In P. Zs. Rétfalvi & E. Vörös (Eds.), *Annona Nova Vii. A Kerényi Károly Szakkollégium Évkönyve* (pp. 83–97), Pécsi Tudományegyetem Bölcsésztudományi Kar, Kerényi Károly Szakkollégium.

Szettele, K. (2020). Kreatív pedagógia. A kreativitás fejlesztésének oktatási koncepciója. *Új pedagógiai szemle, 11–12*, 58–82.

Torrance, E.P. (1990). *Torrance tests of creative thinking*. Scholastic Testing Service, Bensenville, IL.

Thomaidou, C., Konstantinidou, E. & Venetsanou, F. (2021). Effects of an eight-week creative dance and movement program on motor creativity and motor competence of preschoolers. *Journal of Physical Education and Sport*, *21*(6), 3268–3277. https://doi.org/10.7752/jpes.2021.s6445

Tóth, L. & Király, Z. (2006). Új módszer a kreativitás megállapítására: A Tóth-féle Kreativitást Becslő Skála (TKBS). *Magyar Pedagógia*, *106*(4), 287–311.

Vass, V. (2012). A kreatív iskola. *Anyanyelv-pedagógia*, 1 szám. https://www.anyanyelv-pedagogia.hu/cikkek.php?id=374