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Harnessing the Power of Flow: Enhancing Environmental Education for Public Administration Students through Museum-Based Experiential Learning*

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ABSTRACT

Experience-based learning and creative education are crucial to today's higher education practice, and museums can provide ideal environments for such processes. Our study aims to demonstrate how upper-level undergraduate public administration students familiarized themselves with a natural science museum during environmental education sessions founded on the flow-based pedagogical model. Focusing on the learning experiences of 81 university students at the Museum of Natural History in Budapest, we used Dominek's Learning Flow Questionnaire to examine whether museum education courses help students experience the state of flow while learning about environmental values. Our results demonstrate that our complex course was able to drive students to reach flow states during education. Accordingly, our research recommends the application of museum pedagogy, suggesting that it can lead to a flow experience that supports empathy and prosocial attitudes and thus contributes to enhancing social justice as well.

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Environmental education in museums

This study was conceived to explore the value of environmental education presented within a museum education framework among university students. The study was done through an elective Cultural Expeditions course within the Ludovika University of Public Service Department of Social Communication curriculum, and took place at the Museum of Natural History in Budapest. The National University of Public Service in Budapest, also known as Ludovika, is a prestigious institution dedicated to training future professionals in public administration, law enforcement, and defense. As part of the course *Cultural Expeditions* course, students took an expeditionary approach to exploring the Hungarian Museum of Natural Sciences, although they were initially unaware that the course would include a museum visit. The course aimed to provide insight into institutional work, from field research to collection curation, while emphasizing the importance of cultural heritage in shaping national identity. Given the role

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of public service in fostering cultural appreciation, the program offered thematic sessions to deepen students' understanding. Additionally, it sought to support the intellectual and emotional development of future graduates within a culturally rich environment, reinforcing the value of an educated and strong intellectual community. The central objectives of the class were to educate students on environmental issues, develop their cultural identity, and support their transformation into confident and socially committed individuals. In line with the basic considerations of environmental education, this approach centered not only on acquiring theoretical knowledge in the fields of natural sciences and environmental issues,[1] but also on developing competencies that enable students to confidently and effectively apply this knowledge in real life and societal contexts.[12] Based on applied experimental pedagogy that emphasizes the role of cooperation and prosocial activities, the course also aimed to help the students develop "prosocial flow"[2] – an altruistic flow state.[3] The museum provided opportunities for students to gain direct experience with environmental education and its significance, as well as to explore and discuss environmental issues and challenges from creative and critical perspectives.[4]

Each culture contributes to the diversity and richness of society, and the preservation and support of these diverse perspectives and values are beneficial to everyone.[5] Cultural diversity not only enriches human experiences – but also fosters creative thinking and innovation, which then promotes social development and progress. However, accepting cultural diversity can take place only in a society where individuals have a high level of tolerance and, what is more, are willing to help others, typically vulnerable social groups.[6,7] By fostering flow experiences that help develop prosocial skills such as empathy[8] and tolerance, museum classes focusing on environmental education have provided excellent opportunities for promoting social justice.[9] Environmental education is not only about protecting the environment and living sustainably but, by helping to develop skills related to competency, tolerance, and prosocial behavior,[10] also about building a fairer and more equitable society.[11]

Flow state learning in universities and museums

The field of positive psychology emphasizes the joy of learning and development, self-esteem, the perception of success as a reward, the importance of striving to improve, and curiosity.[12,13,14] Central to this field is the notion of "flow." According to psychologist Mihalyi Csíkszentmihályi, who developed the theory of flow, the experiencer of flow is so immersed in one's activity that it becomes effortless, spontaneous, and offers the pleasure of a "perfect experience."[15] Most people expect flow experience to come from a change in external circumstances, which is why we think of our goals as being outside of ourselves.[16] Flow, according to Csíkszentmihályi, can only be experienced when the achievement of challenges creates new desires.[17] There are many different ways to achieve this state, but they have one thing in common: they allow the joy of discovery. They increase the subject's ability to perform and experience a more complex state of consciousness. They can then reach a higher level of self-development, which is the key to the flow experience. Flow is different from simple joy, because simple joy comes from having one of the expectations within us fulfilled. The joy experienced in a flow state is different. According to Csíkszentmihályi, it occurs when we are able to go beyond what was expected and have an experience that we did not expect before.[18]

While the first studies on flow focused mostly on individual experience, later studies started to investigate the possible influence of flow on prosocial behavior. Studies found that, by building more self-competence and tolerance, prosocial activities such as helping others can raise the level of flow.[19] According to recent studies, this optimal experience or flow state can be experienced in community contexts, such as voluntary activities.[20] With this in mind, we can suggest that, by connecting optimal experience to prosocial behavior, flow-based pedagogy can contribute to building social justice.

Among their other purposes, museums can also serve as venues for experiential learning.[21] According to the "contextual model of learning in museums," the quality of visitors' experiences is influenced by personal motivations, social environments, and physical settings.[22] Former studies have demonstrated that museums can play an important role in enhancing the flow experience of visitors and supporting learning processes. For instance, Latham described the "numinous experience" in museums, characterized as a spiritual encounter where an individual enters a sublime, transcendent state.[23] During this state, a unique sense of quality – an incomparable moment – emerges, closely related to the experience of flow. In a related study, Dominek, Demeter, and Ceglédi[24] showed that museum and cultural events, particularly those aimed at students, are effective in inspiring flow-like experiences. Museums, theaters, and concert halls have proven to be ideal venues for experiential and creative learning. The programs offered in these settings are well-crafted for most students, providing an optimal level of challenge while maximizing the flow experience.[25]

The flow-based pedagogical model

The flow-based pedagogical model, developed by the author, focuses on the optimal experience and performance of learning based on the flow theory.[26] The aim of the model is to organize the learning process so that students reach a state of flow as often as possible. This state occurs when students are fully immersed in the learning activity, find it challenging, and enjoy it. The model contains six interconnected pillars that aim to drive students to reach the flow state during education.

(1) *Balance of Challenges and Abilities*: Learning tasks should challenge students in a way that matches their abilities. This helps to avoid boredom and anxiety and maintains interest and motivation.
(2) *Clear Goals and Immediate Feedback*: Students should be given clear goals and continuous, immediate feedback. This helps them to know whether they are on the right track and how they can improve their performance.
(3) *Focus and Attention*: Learning activities should fully engage students' attention. Interactive and experiential learning methods help to maintain concentration.
(4) *Sense of Control*: Students should feel in control of the learning process. This increases their confidence and commitment to learning.
(5) *Loss of Sense of Time:* In an optimal learning environment, students are so immersed in the tasks that they lose track of time. This is a key element of deeper learning.
(6) *Experience is For Its Own Sake:* Learning activities should be enjoyable and intrinsically rewarding. Students not only learn for the external rewards, but also enjoy the process of learning.

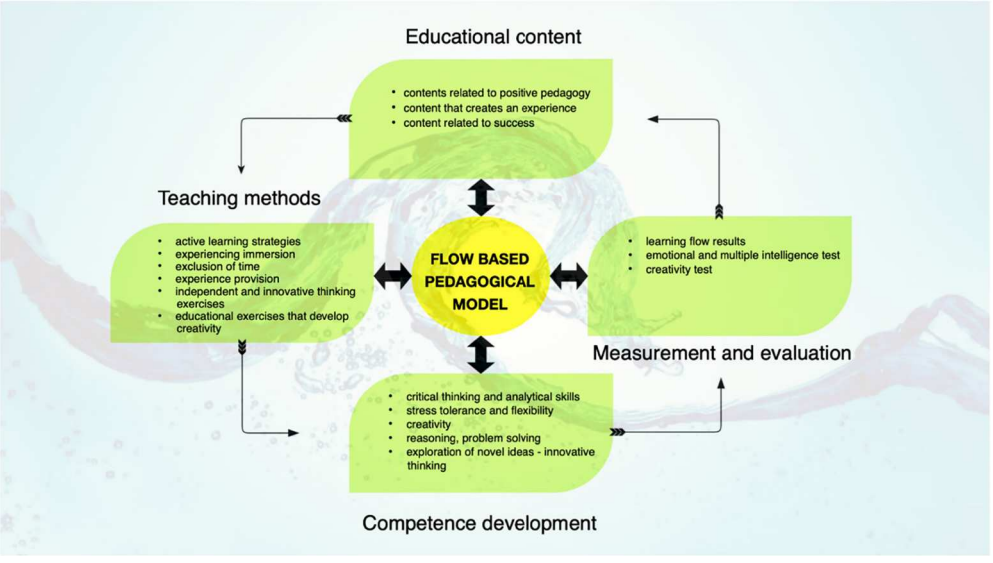

Figure 1. The main components of Dominek's flow-based pedagogical model (source: Dominek, 2022).

This model supports students' deep attention, sense of control, and enjoyment of learning, helping them to achieve and maintain a state of flow while learning (Figure 1).

In this study, we aimed to test whether museums are capable of developing flow-based learning by providing flow experience during education. Accordingly, we developed the following research question:

> RQ: How does museum education in the context of environmental education and flow-based pedagogy contribute to positive learning experiences and flow-state development amongst university students?

Methods and measurements

Case settings and sample characteristics

In order to test whether the students' experience in the museum could lead to a flow-like experience based on environmental education, we took the students to the Hungarian Natural History Museum,[3] where they participated in an interactive lecture. In the second half of the lesson, we processed what they had seen on the campus in a digital environment. The museum organized a preparatory lecture before the event and a follow-up lecture after the event. Students participated in interdisciplinary workshops designed to provide hands-on experience in various scientific fields. At the Museum of Anthropology, they examined human and animal bones, matched fragments, and explored scientific collecting and research practices. In the Botanical Library, they engaged with moss and flower collections, learned about storage methods, and performed preservation tasks. At the zoo, one session focused on snakes and frogs, covering laboratory procedures, DNA storage, and specimen preparation, while another explored the ecological links between forests, bats, viruses, and humans, including bat capture and

expedition methods. In the minerals and rocks collection, students examined specimens and learned about collection management and exhibition design.

To encourage immersion and engagement, students were given no predefined parameters, allowing for a more intuitive and exploratory learning experience. After the four-hour museum session, the students were directed to university classes for another four hours, where they were given the assignment to create a virtual environmental education museum using a board game combined with the app Genially, which allows users to build interactive games and multimedia learning experiences.[27] The themes of the museum presentations were manifold, including the relationships between the environment, viruses, and humanity; the role of expeditions in environmental research; botanical research; minerals, rocks, and gems; taxonomy and conservation; and modern methodologies in environmental research.

After this eight-hour lesson, which took place five times, students were asked to complete Dominek's Learning Flow Questionnaire (DsFQ) to measure their flow experience.[28] All together, the number of participants who completed the survey was 81 (female: 64%, male: 36%, BA student: 21%, MA student: 79%).

The survey

The DLFQ is a measure of flow experience during learning activities. The purpose of the questionnaire is to identify the state of flow in the context of learning and to understand what factors contribute to students' immersive and enjoyable learning experiences. The DLFQ can be used to measure the impact of different learning environments and methods on students' experience of flow, and to assess the extent to which a particular pedagogical method contributes to students' experience of flow. Based on the results of the DLFQ, educators can modify learning environments and methods to enhance students' flow experience. The questionnaire can help to identify the factors that contribute to increasing student motivation during learning activities.

In the survey,[29] respondents were presented with 16 statements. They were asked to rate their level of agreement with the statements on a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree). The 16-item questionnaire consisted of two factors. The first, with 8 items, measured the characteristics of the immersion scale, while the second, with 8 items, was related to balance. The immersion factor refers to the basic conditions of entering the flow zone, while the balance factor summarizes the phenomena accompanying the flow. The internal reliability of the scales is high (αK-K = 0.878; αE = 0.767).

Analysis strategy

To address our research question, we tested the score distribution of the DLFQ's two factors and measured score frequencies for the aggregated factor with all 16 questions. We also calculated cross-tabulations to check whether there were gender differences in the score distribution patterns between male and female respondents. Chi-square tests were run to test whether there were statistically significant differences between genders in scores for both the individual factors and the aggregated sample. Finally, we tested by Pearson correlation and linear regression whether the two factors of the DLFQ

correlate with each other, to assess whether the students who score higher on the immersion factor get higher scores on the balance factor as well.

Results and discussion

In the context of museum education and flow experience, our research corroborates studies that find no statistically significant differences in flow experiences between genders. Specifically, our study supports the findings of Dominek, Demeter, and Ceglédi, who found no gender differences in the level of experienced flow among university students who attended museum lectures.[30] Our results also align with Csíkszentmihályi's findings, which indicate that both male and female participants describe the flow experience using similar terminology.[31]

A possible explanation can be that flow experience might be a universal psychological state that arises from optimal engagement in activities, irrespective of gender. The core elements of flow – such as a balance between challenges and skills, clear goals, immediate feedback, deep concentration, and intrinsic enjoyment – are human experiences[32] that are not inherently gender-specific. A related explanation can be that the subjective nature of flow means that the individual's personal engagement and intrinsic motivation are key determinants of experiencing flow, rather than external factors related to gender.[33] In other words, both men and women are able to possess the psychological traits necessary for flow, such as the ability to focus, the desire for mastery, and the capability to immerse themselves in an activity.[34] However, in some details, our results contradict the findings of Dominek, Demeter, and Ceglédi, [35] who found a slight gender difference in the Merging of Action factor of the Flow-state survey of Mogyoródy et al.,[36] which means that different surveys might show slightly different results in measuring flow. Besides this explanation, we can also suggest that different museal arrangements and topics affect gender relations differently, as the aforementioned research was conducted in the context of artistic and cultural issues, while our current research's context is environmental education with a more natural-scientific perspective.

Our analysis revealed that the likelihood of experiencing q flow state was high in both factors and on the aggregated survey. In the balance factor, the vast majority of the respondents gave high scores on the questions regarding flow experience. As Figure 2 shows, the mean is 33 out of 40, and the number of respondents who gave more than 35 points is especially significant.

Similarly, respondents gave positive feedback to the questions in the immersion factor (Figure 3). Here, the mean is over 30 out of 40, significantly higher than expected. As in the case of the balance factor, most students gave higher scores than 30, which means a significant chance for them to experience flow-like states during their museum courses and afterwards.

As both the balance and immersion factors were positively skewed toward higher values, the aggregated histogram shows this pattern, too (Figure 4). Here, the mean is over 63 out of 80, which shows a significant likelihood of experiencing flow states in the context of museum education and the subsequent university lectures related to students' experience in museum learning.

Results also reveal the interconnectedness of the two factors, as their Pearson correlation is very high ($R = .685$ $p < .001$). Linear regression shows the predictability of the

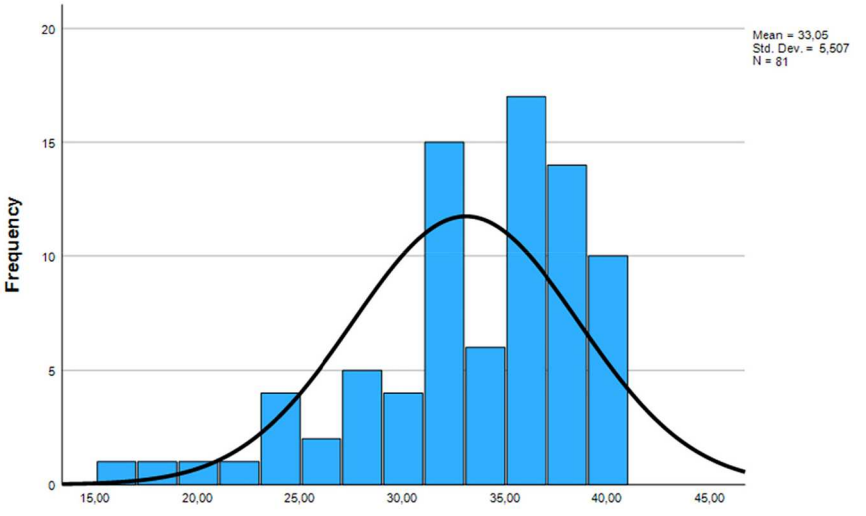

Figure 2. The distribution of values in the balance factor.

immersion factor from the balance factor ($F = 69.74$; $\beta = .685$, $p < .001$), which means that students with high values on the balance factor have a greater chance of giving higher scores on the immersion factor, too.

The explanations for the high scores can be manifold. As former research shows, museums provide an interactive and stimulating environment that encourages exploration and curiosity,[37] and it is especially true in the case of environmental education, where the topic is evidently related to the everyday life of the students and supports strong involvement. Specifically, environmental issues are among the hottest topics for

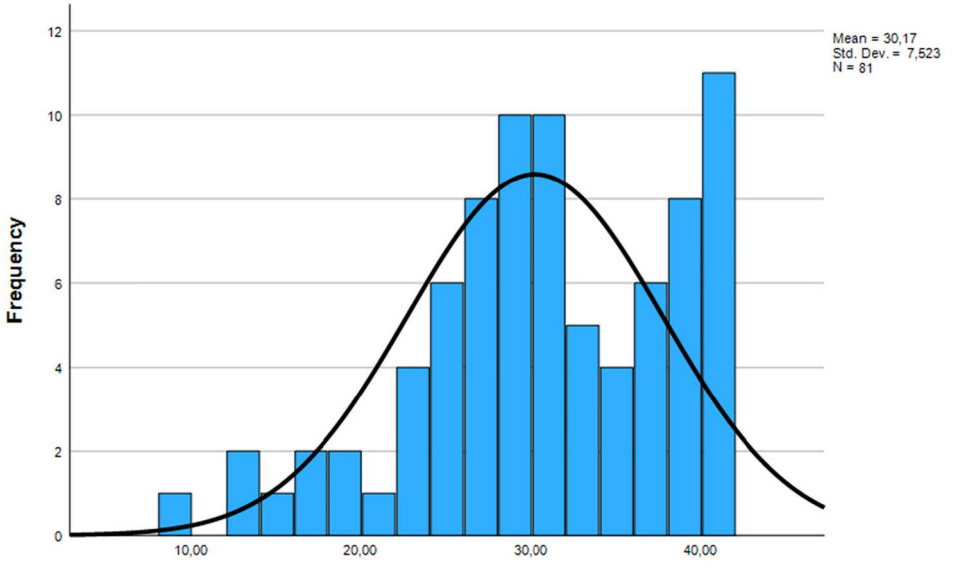

Figure 3. The distribution of values in the immersion factor.

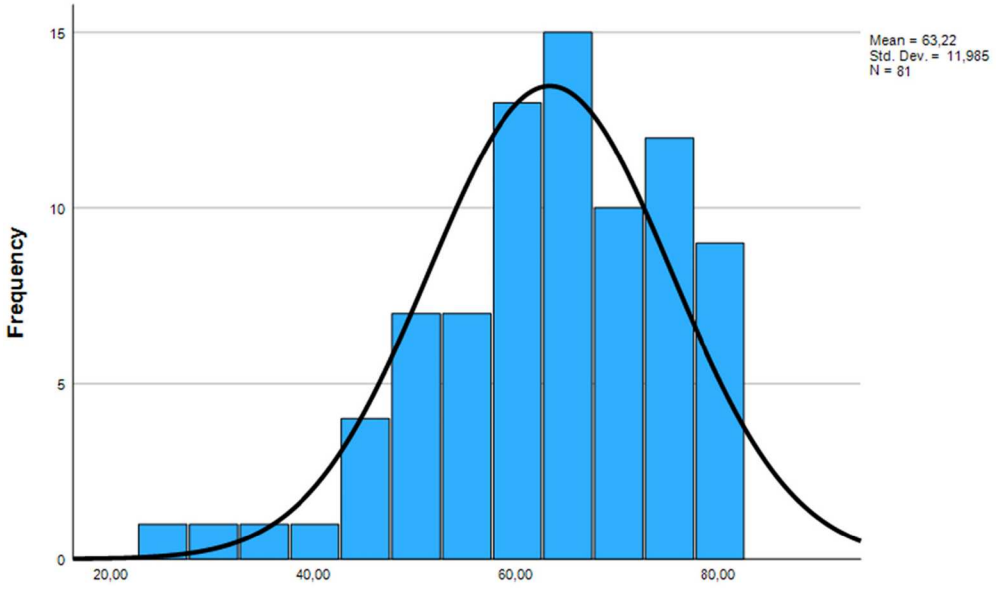

Figure 4. The distribution of values in the aggregated factor (balance + immersion).

younger generations, including university students,[38] and in the museum environment, they can explore real-life presentations of the problems they learn about through both formal education and the media. Accordingly, their involvement in learning processes focusing on environmental issues can be very significant, and our results show that museums provide an ideal context supporting this endeavor.

The dynamic setting, paired with follow-up university classwork, is conducive to achieving a balance between challenge and skill, which is a crucial factor for flow.[39] Moreover, the follow-up activities contribute to sharing the flow experience in a community context, where several prosocial skills – empathy, social aid, and tolerance – were discussed. With this, the observation and interpretation of the optimal experience went beyond the level of the individual. They helped students understand how positive individual experiences can make them turn to their associates and local communities.

In the context of creative learning, museums are considered to be amongst the environments with the most professional, meticulously selected content: exhibitions are designed to be informative and visually appealing, which helps maintain students' interest and attention, fostering an immersive experience. In a similar way, museums offer a variety of creative learning modalities, including visual, auditory, and kinesthetic experiences that support different learning preferences and help students engage with the material.[40] In our follow-up university courses, the same variety of activities was offered, showing that the methods used in museum education can also apply to university courses.[41]

Based on their experiences in real museums, students were assigned to build virtual museum environments in the class, so their positive experiences during museum education were recalled at the university during a swap process. In other words, our findings show that museum education and university classroom education can be interrelated in many aspects, where versatile modalities and activities can be applied to build a

creative learning experience that can even cause a psychological flow state. University classroom education can be successfully enhanced with museum education, and museums can attract more people from younger generations for educational purposes. Thus, environmental education can be enriched by both classical university education (with creative learning policies) and museum events organized for educational purposes.

Recommendations

Flow experience and prosocial behavior can contribute to a positive cycle of individual competency and community support.[42] Our study revealed that flow-based museum education, together with follow-up courses, can contribute to developing flow-experience and thus enhance the level of awareness regarding the well-being of others and the willingness to help them through common activities. This finding is especially important, considering that the students in our experiment study public administration, so their profession is to serve their local communities. The quality and efficiency of public services directly impact citizens' lives and their well-being. Tolerance and empathy might enable public administration students – later public administration professionals – to better understand and serve a diverse population, potentially leading to more inclusive and equitable public policies and services that meet the needs of all community members, especially more vulnerable social groups. Moreover, demonstrating tolerance and inclusivity might help public administration professionals build stronger relationships with their local communities; and it is well known that trust is critical for effective governance and service, as it leads to greater public cooperation and participation in civic processes. Consequently, while we recommend using flow-based creative pedagogy and museum education for all students, we emphasize the special importance of this kind of education in the case of students whose future job is related to the service of their communities.

Limitations and future research directions

Our quantitative research revealed some general patterns that can explain why flow experience can provide useful tools for environmental education. However, the study has limitations that future research should address.

First, our research focused exclusively on the visitor (student) experience. Conducting qualitative research with program planners and leaders of the institutions would enhance our understanding of the success of the flow-based pedagogical model. This approach would provide insights into both the intended outcomes and the actual results of these programs.

Second, additional research should link the visitor and performance aspects of cultural visits by conducting qualitative investigations such as interviews and focus group consultations.

Third, our research revealed that there can be slight or even major differences in measuring flow-state experiences if we use different surveys. While these measurements are valid and appropriate tools in themselves, a cross-comparison of results conducted by different surveys would be an interesting meta-analysis.

Finally, our research points out possible differences in experiencing flow across disciplines or subject areas. Accordingly, future research might investigate the relevance of topics in the likelihood of experiencing flow through creative pedagogy in the context of museum education.

Notes

1. McPhee, "Environmental Education."
2. Dillon and Herman, "Environmental Education."
3. Mesurado and Richaud, "The Relationship between Parental Variables, Empathy."
4. Dominek, Demeter, and Ceglédi, "Flow Measurement in Cultural Institutions."
5. Infield and Mugisha, *Culture, Values and Conservation*."
6. Kwan, Leung, and Liou, "Culture, Creativity, and Innovation."
7. Barak and Yuan, "A Cultural Perspective to Project-Based Learning."
8. Bachen, et al., "How Do Presence, Flow, and Character Identification."
9. Gustafsson and Akram, "Museums."
10. Mesurado and Richaud, "The Relationship between Parental Variables, Empathy."
11. Gadotti, "Education for Sustainability."
12. Seligman et al., "Positive Psychology Progress."
13. Csíkszentmihályi, *Flow: The Psychology of Optimal Experience*.
14. Seligman et al., "Positive Psychology Progress," 410.
15. Csíkszentmihályi, *Flow: The Psychology of Optimal Experience*.
16. Csíkszentmihályi, *Creativity: Flow and the Psychology of Discovery and Invention*.
17. Csíkszentmihályi, "Attention and the Wholistic Approach to Behavior."
18. Csíkszentmihályi, If We Are So Rich, Why Aren't We Happy?"
19. Mesurado and Richaud, "The Relationship between Parental Variables, Empathy."
20. Mesurado and Minzi, "Optimal Experience in Argentinean Children and Adolescents."
21. Dominek, *Flow avagy játékos kommunikáció a múzeumokban*.
22. Dominek, Demeter, and Ceglédi, "Flow Measurement in Cultural Institutions in the Framework."
23. Latham, "Psychological Flow and the Numinous Museum Experience."
24. Dominek, Demeter, and Ceglédi, "Flow Measurement in Cultural Institutions."
25. Ibid.
26. Dominek, "On a Flow-Based Pedagogical Model."
27. de Souza, Renata Torres Mattos, and Kasseboehmer, "The Thalidomide Mystery."
28. Dominek, "Dominek-féle Tanulási Flow Kérdőív."
29. Ibid.
30. Dominek, Demeter, and Ceglédi, "Flow Measurement in Cultural Institutions."
31. Csíkszentmihályi, *Flow: The Psychology of Optimal Experience*.
32. Abuhamdeh, "Investigating the 'flow' Experience."
33. Peifer, et al., "A Scoping Review of Flow Eesearch."
34. Hsieh, Lin, and Hou, "Exploring the Role of Flow Experience."
35. Dominek, Demeter, and Ceglédi, "Flow Measurement in Cultural Institutions in the Framework."
36. Magyaródi et al., "Egy újonnan kidogozott flow állapot kérdőív kimunkálása és pszichometriai jellemzőinek bemutatása."
37. Pohanna Pyne and Lemaire. "Experimenting Interpretation."
38. Casalegno, Candelo, and Santoro, "Exploring the Antecedents of Green and Sustainable Purchase Behaviour."
39. Nakamura and Csíkszentmihályi, "The Concept of Flow."
40. Pohanna Pyne and Lemaire, "Experimenting Interpretation."
41. Dominek, "On a Flow-Based Pedagogical Model."
42. Mesurado and Richaud, "The Relationship between Parental Variables, Empathy."

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