Pertanika J. Soc. Sci. & Hum. 34 (1): 155 - 181 (2026)

PERTANIKA JOURNALS

SOCIAL SCIENCES & HUMANITIES

Journal homepage: http://www.pertanika.upm.edu.my/

Trends and Research Themes regarding the Flow Experience in Social Science: A Comprehensive Bibliometric Analysis

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ABSTRACT

This study performed a bibliometric analysis to delineate research trends regarding flow experiences from 2000 to 2024. Utilising Mihaly Csikszentmihalyi's comprehensive theoretical framework on flow and addressing the shortcomings of prior research, data were obtained from Google Scholar via two distinct strategies concentrating on the keyword clusters "flow experience" and "flow state." The analysis indicated a substantial rise in flow-related papers, particularly since 2014. Research trends on this subject have also broadened to encompass other domains, like education, sports, technology, and mental health, beyond the conventional realm of psychology. The analysis of keywords and their co-occurrence identified significant clusters of research topics: (1) User-technology interaction, (2) Education, learning, and personal development, (3) Personal experiences, (4) Flow-based games, (5) Video games, anxiety, and achievement. The study ultimately proposes further research avenues, such as the integration of modern technologies, the construction of a comprehensive flow scale, and investigations within certain demographics, occupational settings, health, and sustainable development.

Keywords: Bibliometric, co-occurrence analysis, flow experience, VOSviewer

ARTICLE INFO

Article history:
Received: 29 April 2025
Accepted: 12 January 2026
Published: 06 February 2026

DOI: https://doi.org/10.47836/pjssh.34.1.08

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INTRODUCTION

The phenomenon of flow, characterised by intense focuss, complete immersion, and deep satisfaction in an activity (Czikszentmihalyi, 1990), has attracted substantial research attention across diverse

e-ISSN: 2231-8534

fields over decades. First described by Mihaly Csikszentmihalyi in 1975, flow has been associated with numerous positive outcomes, including enhanced performance, creativity, happiness, and overall well-being. Per Zhang et al. (2024), 2622 documents were catalogued on Scopus from 1982 to 2021, with international researchers progressively elucidating flow through connections to self-determination theory and the technology acceptance model. Among these publications, flow in gaming predominated, followed by technology, where complex features attract user experience. Fundamentally, flow frequently manifests in psychological and behavioural research (Seligman & Csikszentmihalyi, 2000) as an absorptive, positive state (Beard, 2014) with six key traits: intense focuss, merged action and awareness, lost self-consciousness, perceived control, altered time perception, and intrinsic reward (Nakamura & Csikszentmihalyi, 2002).

Since the foundational publications in Csikszentmihalyi (1997), flow has evolved from a concept rooted primarily in psychology into a broad, multidisciplinary construct. Researchers have systematically examined flow across diverse contexts, including education, sports, music, tourism, work, and technology (deMatos et al., 2021; Swann et al., 2018; Tan & Sin, 2019). Several studies have focussed on the development and validation of instruments, such as the Flow State Scale and the Flow State Scale-2, to capture both the state and dispositional aspects of flow, thereby enabling more rigorous empirical investigations.

Parallel to this, flow has been increasingly studied in technology-mediated environments. Early work on hypermedia and online consumer experience showed how interactive systems can facilitate flow-like states (Hoffman & Novak, 1996; Novak et al., 2000). Subsequent research integrated flow with technology-related models by extending the Technology Acceptance Model (TAM) to examine online consumer behaviour, web usage, and e-learning (Hoffman & Novak, 2009; Hsu & Lu, 2004a; Lee, 2010). In digital games and game-based learning, flow has been used to explain immersion, engagement, and learning outcomes (Boyle et al., 2016; Kiili, 2005; Perttula et al., 2017). Other strands of research have examined flow in relation to the problematic uses of technology, such as Internet gaming addiction and its psychological consequences (Kuss & Griffiths, 2011). Together, these developments suggest that flow is now a central construct for understanding human experience in both offline and online settings. Given the rapid expansion of this field, several reviews have attempted to synthesise flow research in specific domains or periods. For instance, Tan and Sin (2019) analysed flow in music contexts, deMatos et al. (2021) provided a conceptual extension of flow experience in tourism. More recently, Zhang et al. (2024) conducted a large-scale bibliometric analysis of flow research over 40 years using Scopus data and identified phases of development and primary thematic directions. These contributions highlight the importance of cross-disciplinary flows

and demonstrate the value of bibliometric approaches for mapping complex, evolving research landscapes.

Despite these advancements, several significant gaps persist in the literature. First, existing bibliometric syntheses are constrained in terms of both temporal and conceptual scope. Zhang et al. (2024) examined publications up to 2021, thereby excluding the most recent surge in flow research, particularly post-2014, from a comprehensive bibliometric framework. Second, previous reviews often concentrated on specific contexts, such as gaming, sports, or tourism, or depended on a single database, which limits our comprehension of the diversification of flow research across various disciplines and theoretical perspectives. Third, although individual studies have investigated the connections between flow and other frameworks—such as its role within positive psychology, its links to user experience in technological contexts, and its application in learning and mental health—there remains a deficiency in an integrated overview that concurrently considers publication trends, key outlets, influential works, and thematic clusters across the broader social science landscape (Koufaris, 2002; Kuss & Griffiths, 2012; Zhang & Wang, 2024). To address these gaps, this study provides a comprehensive bibliometric analysis of flow experience research in the social sciences from 2000 to 2024 to answer the following research questions (RQs):

- (RQ1) What are the current research trends in flow experience studies?
- (RQ2) How are flow-related publications distributed across journals and publishers?
- (RQ3) Which publications or foundational works have been most influential in flow research, and how have they shaped the field's evolution?
- (RQ4) What are the main research themes or clusters in flow literature, based on keyword co-occurrence and other bibliometric analyses?
- (RQ5) What future research directions emerge from these trends and themes in flow research?

This paper follows a five-section structure, with an introduction that establishes the flow experience theory, identifies research gaps, and presents research questions. The Research Method section details the data collection from Google Scholar, extraction processes, and analysis using Microsoft Excel and VOSviewer. The results present findings on publication trends (2000-2024), journal distribution patterns, and research themes, based on reference and keyword analysis. The Discussion synthesises the findings to address the research questions by examining trends, publication patterns, and theoretical developments. The paper concludes with Limitations and Future Research, suggesting directions for future analyses, supported by tables and visualisations illustrating the evolution of flow experience research.

THEORETICAL FRAMEWORK

Flow theory, developed by Mihaly Csikszentmihalyi, describes a psychological state of optimal experience in which individuals are fully immersed in an activity, feeling cognitively efficient, deeply motivated, and happy. This state, often referred to as flow, is characterised by several key elements: (1) complete absorption, wherein people in flow are wholly focussed on a task that they undertake and are in a merged state of action and awareness (Biasutti, 2011, 2016); (2) intrinsic motivation, wherein flow is intrinsically motivating, which is to say that it is an activity performed for its own sake rather than for external rewards (Pace, 2004; Palomäki et al., 2021); (3) balance of challenge and skill, wherein flow occurs with a balance between an activity's challenges and one's skill level, leading to an individual's sense of control and mastery (Lambert et al., 2013; Maheshwari et al., 2023); (4) clear goals and feedback, wherein having clear goals and immediate feedback is crucial for maintaining flow, as it helps individuals stay focussed and adjust their actions accordingly (Cseh, 2016); and (5) positive experience, wherein flow is associated with positive emotions, peak performance, and often creativity (Chilton, 2013). Thus, flow must be considered not as a fixed experience of satisfaction but as a dynamic equilibrium that requires a constant increase in complexity. Thus, as people increase their abilities, the corresponding difficulties must become more challenging if they are to remain in a state of flow (Ishimura & Kodama, 2009).

Flow is an intrinsically motivated experience, aligned with principles identified in Self-Determination Theory (SDT) (Ryan & Deci, 2000), that views human requirements for competence and autonomy as often being found in experiences that generate flow. Intrinsic motivation, one dimension of SDT, correlates strongly with experiences of flow. For example, in online game-based learning, intrinsic motivation positively influences enjoyment and attentional focuss, both of which are essential for achieving a flow state (Lin et al., 2025). In recent years, flow research has intersected with technology adoption models. Typically, the Technology Acceptance Model (TAM) of Davis (1989) has been applied to understand how flow influences user engagement and acceptance of digital technologies such as online games and e-learning platforms. The extended TAM model based on SDT shows that autonomy and relatedness significantly influence perceptions of ease of use and attitudes toward technology use (Al Oraini, 2024). By combining these frameworks, this study examines the flow literature not only in terms of publication trends but also through the lens of underlying psychological and technological theories, providing a richer foundation for analysing research topics.

RESEARCH METHOD

Data Collection

This section discusses the collected database system, the first issue addressed when drafting initial research ideas. Scopus and Web of Science (WoS) data are widely

utilised in bibliometrics, enabling detailed exportation suitable for in-depth analysis (Donthu et al., 2021). Scopus is common since WoS is considered a subset, with most WoS journals also indexed by the larger Scopus. However, Scopus includes more journals pending WoS inclusion, particularly in social sciences and humanities (Mongeon & Paul-Hus, 2015). Other findings indicate Scopus indexes more Brazilian journals than WoS (Miguel et al., 2016) and is more comprehensive overall (Falagas et al., 2008). However, Google Scholar excels in coverage (Gusenbauer, 2018; Martín-Martín et al., 2018). Despite unknown indexing quality and policies, Google Scholar has significantly expanded coverage over the years as a robust scholarly literature database. Caution is still warranted relying on Google Scholar for citations and metrics vulnerable to manipulation, with indexing quality remaining challenging (Halevi et al., 2017). Thus, while suiting this study, Google Scholar required systematic, effective extraction to leverage information while ensuring quality value. Additionally, this comprehensive, multi-source approach can help reduce researcher subjectivity and increase result objectivity (Lim & Kumar, 2023). Creating vivid, comprehensible visual data maps enables evaluating published research output, significance, and quality (Punj et al., 2023).

In summary, this study used Google Scholar as the primary data source, accessed through Publish or Perish software guided by Harzing (2007), to facilitate systematic querying and extraction. Two search strategies were designed to retrieve relevant publications containing the keywords "flow experience", "flow state", or "flow theory" (ensuring the term "flow" appeared in the title for focussed searching in the first strategy). Both searches were limited to the years 2000-2024 and were performed on September 2, 2024. In method 1, the study applied an additional filter requiring "flow" in the publication title, yielding 1,958 initial records. Meanwhile, method 2 applied a broader search strategy without using the title-specific filter, yielding 4,047 records. The results from each method were exported and filtered to remove entries missing the necessary bibliographic information (author, title, year) and duplicate entries. After filtering, 1,846 documents remained in the first dataset (Method 1) and 3,777 documents in the second dataset (Method 2). These two datasets are analysed separately and compared in detail in Table 1 to ensure the accuracy of the results.

To ensure reproducibility and transparency, this study followed the PRISMA 2020 guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). The selection process followed a four-stage process.

Identification: Records were identified from Google Scholar using Harzing's Publish or Perish software to overcome display limitations. The search string detailed in Table 1 provided the total number of articles before filtering (1958 for Approach 1 and 4047 for Approach 2).

Screening: Duplicate records where Google Scholar indexed a single article

Table 1
Approach to extracting data from Google Scholar

Approach	Step	Activity	Description	Tool	Result
1	1	Keyword search	Search for keywords "flow experience" or "flow state" or "flow theory" in the title, or keywords of articles. Additional filter: Require the word "flow" to be present in the article title.	Google Scholar	-
	2	Data extraction	Extract data within a 25-year timeframe (2000-2024). Date of data research: 2/9/2024	Publish or perish	1958 documents
	3	Data filtering	Remove documents with missing information (publication year, author name, article title) or duplicate content.	-	112 documents removed 1846 documents remaining
2	1	Keyword search	Search for keywords "flow experience" or "flow state" or "flow theory" in the title or keywords of articles.	Google Scholar	-
	2	Data extraction	Extract data within a 25-year timeframe (2000-2024). Date of data research: 2/9/2024	Publish or perish	4047 documents
	3	Data Filtering	Remove documents with missing information (publication year, author name, article title) or duplicate content.	-	270 documents removed 3777 documents remaining

multiple times, such as preprint, school, and journal web versions. The study used software (such as Excel and R Studio) to merge duplicate records.

Inclusion/Exclusion screening: Titles were screened for eligibility. The pre-study excluded articles that were not related to "psychology" or "social sciences". For example, articles on "fluid flow", "cash flow", or "traffic flow" were excluded.

Eligibility: Validity check and data cleaning. The exclusion criteria were as follows: (1) articles without author names; (2) articles missing publication year or journal name; (3) documents that were not scientific articles (e.g., table of contents, preface, letter to the editor); and (4) articles not written in English.

Eliminated: 112 documents from method 1; 270 documents from method two after screening and validity check steps

Inclusion: Number of clean records loaded into VOSviewer to run the analysis (1846 and 3777 articles).

Data Analysis Method

According to Donthu et al. (2021), bibliometrics employs two main techniques: performance analysis and science mapping. Specifically, performance analysis focusses

on publication statistics like document numbers by year, journal, or country, and citation indicators such as citations per document. Science mapping often utilises network analysis to explore relationships between research components including authors, author connections, keywords, or cited references. Co-occurrence of two components in the same document (e.g. co-listed keywords) indicates a link between them, with link strength directly determined by co-occurrence frequency (higher frequency, stronger link). Linking research components as nodes forms diverse academic networks. This study used Microsoft Excel and VOSviewer for bibliometric analyses suiting Google Scholar parameters (Passas, 2024).

RESULTS

Publication and Citation Trends of the Flow

The number of studies conducted over time indicates scholarly interest in a field. Since introducing the concept of flow, Csikszentmihalyi and Figurski (1982) have sought to foster intrinsic motivation and interest through flow in higher-education settings. Per Zhang et al. (2024), flow research long remained limited. Despite this minimal attention, Csikszentmihalyi significantly advanced flow theory, publishing foundational works in 1975, 1990, and 1997. However, flow research has increased substantially in the early 21st century. In both approaches, publications from 2000-2010 accounted for nearly 14% (Figure 1), which was considered the transitional flow study period. As famous authors like Novak et al. (2000) built on Csikszentmihalyi's foundations with influential publications measuring online customer experience through structural modelling, flow research expanded. Koufaris (2002) also published an influential study that applied technology acceptance and flow theory to online consumer behaviour. Additionally, Nakamura collaborated with Csikszentmihalyi on the seminal 2002 publication “The Concept of Flow.”

The research trends of the first approach in Figure 1 resemble those of the second data approach, particularly the decline in 2008 and the notable increase in 2012. Both approaches continuously rose and fell until 2019. In 2019, new VR technology flow research trends emerged, given the development premises (Kim & Ko, 2019). Outstanding growth in flow research occurred in 2022 and 2023 for both approaches. However, the first data analysis showed a significant decrease in publications in 2023. Regardless, from 2014 to 2024, publications accounted for over 75% of the total observation period in both data approaches. This trend requires further examination in subsequent keyword and author trend analyses.

Figure 2 visualises divergent early citation trends between the two data approaches. This stems from Novak et al. (2000) highly cited publication on measuring online customer experience through structural modelling, with 5141 citations. The first data approach provided superior filtering but missed influential

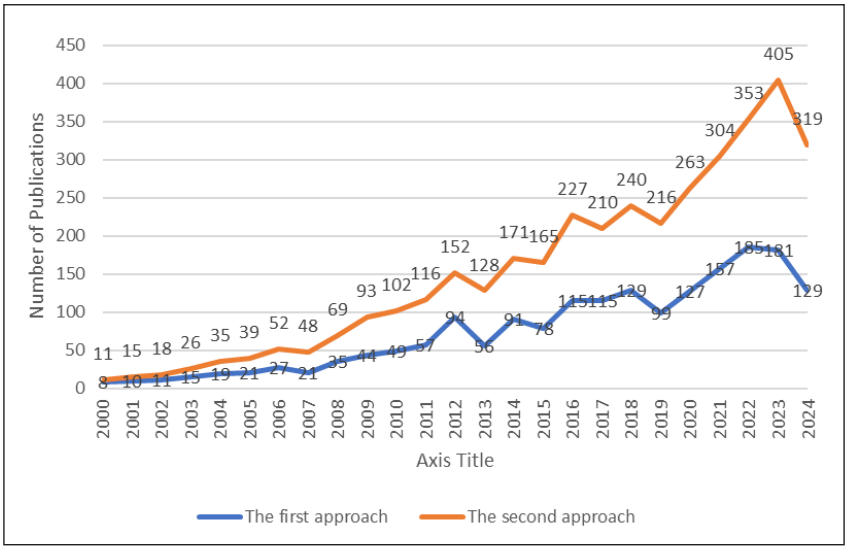

Figure 1. Number of publications related to flow according to two data approaches
Note. 2024 data is only calculated as of September 2, 2024

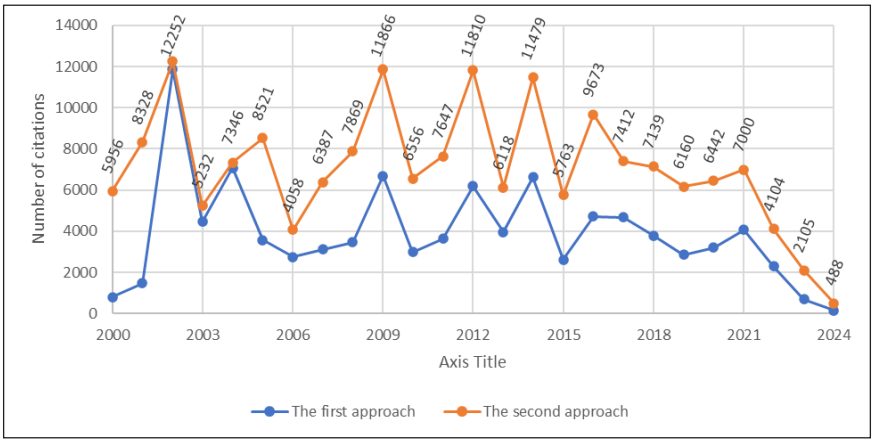

Figure 2. Trends of paper's citations for year
Note. 2024 data is only calculated as of September 2, 2024

flow studies without "flow" in the title. This continued in 2001 with Moon and Kim (2001) prominent study on website experience, usefulness, and ease of use. However, citation trends became relatively similar after that. Both roughly overlapped from 2002 to 2004, followed by a notable decline until 2008. The declining trend then steadily rose and stabilised through 2021.

Publication Patterns of Flow Research

The first approach analysed 1846 published documents, with only 43 publishers producing five or more articles with "flow"

Table 2
Top 10 publishers on the topic of flow

Publisher	The first approach		The second approach	
	Count	%	Count	%
Springer	186	10.08%	356	9.43%
Taylor & Francis	182	9.86%	318	8.42%
Elsevier	148	8.02%	265	7.02%
Sage	69	3.74%	127	3.36%
Emerald	58	3.14%	119	3.15%
Frontiers	51	2.76%	83	2.20%
IEEE Xplore	41	2.22%	90	2.38%
Wiley	38	2.06%	66	1.75%
MDPI	31	1.68%	63	1.67%
Inderscience	15	0.81%	29	0.77%
Total publications	1846	44.37%	3777	40.14%

Table 3
Top 10 most published journals flow research in a data-first approach

Rank	Journal	TP (Count)	TP (%)	Publisher	TC	TC/TP
1	Frontiers in Psychology	45	2.44%	Frontiers	1651	36.69
2	Computers in Human Behaviour	31	1.68%	Elsevier	7561	243.90
3	Advances in flow research	19	1.03%	Springer	1588	83.58
4	Sustainability	13	0.70%	MDPI	376	28.92
5	Current Psychology	10	0.54%	Springer	260	26.00
6	Journal of Retailing and Consumer Services	9	0.49%	Elsevier	1448	160.89
7	Psychology of Music	8	0.43%	Sage	881	110.13
8	Information & Management	5	0.27%	Elsevier	1064	212.80
9	Journal of Happiness Studies	5	0.27%	Springer	552	110.40
10	Telematics and Informatics	5	0.27%	Elsevier	791	158.20
TP: Total Publications, TC: Total Citations						

in the title. In contrast, the second approach identified 77 publishers with over five articles on flow without requiring "flow" in the title, broadening the scope. Table 2 shows that the top 10 journals in both approaches comprise just 40.14-44.37% of total publications, indicating relatively diverse flow publishing with substantial fragmentation across publishers.

Tables 3 and 4 further delineate the flow topics published across journals. In the first approach, "Frontiers in Psychology" accounted for 2.44% of the 1846 total documents, ranking first among flow

Table 4
Top 10 most published journals flow research follows a second data approach

Rank	Journal	TP (Count)	TP (%)	Publisher	TC	TC/TP
1	Frontiers in Psychology	73	1.93%	Frontiers	2332	31.95
2	Computers in Human Behaviour	51	1.35%	Elsevier	11095	217.55
3	Advances in flow research	21	0.56%	Springer	1827	87.00
4	Sustainability	21	0.56%	MDPI	623	29.67
5	Computers & Education	18	0.48%	Elsevier	3964	220.22
6	Journal of Retailing and Consumer Services	14	0.37%	Elsevier	1722	123.00
7	Internet Research	11	0.29%	Emerald	1435	130.45
8	Psychology of Music	10	0.26%	Sage	950	95.00
9	Information & Management	9	0.24%	Elsevier	1426	158.44
10	Telematics and Informatics	9	0.24%	Elsevier	1401	155.67

TP: Total Publications, TC: Total Citations

publications from 2000 to 2024 (Table 3). This number decreased slightly in the second approach, although the journal still ranked first with nearly 32 citations per publication (TC/TP). The journal Computers in Human Behaviour, published by Elsevier, showed the highest scholarly interest in developing flow, with an average TC/TP of 244 citations per publication.

The top 10 journals accounted for only 6-8% of total publications in both approaches, yet 15-17% of citations. Despite the fragmentation, journals from key publishers still attracted substantial researcher attention, as Table 4's second approach data shows. With just 18 of 3777 (0.48%) documents, “Computers & Education” averaged 220 citations per publication, along with "Computers in Human Behaviour" representing the most cited journals, superior to the other eight in the list. This demonstrates that although Flow originated in psychology, its most significant application value today lies in the human-computer interface (HCI). Flow research in technology receives much more attention (citations) than pure psychology research.

Research Background, Main Themes, and Trends

Reference Analysis

Table 5 presents the publications from the second approach with 1000+ citations to fully represent the under-filtered studies identified in the citation trend analysis. Csikszentmihalyi has remained integral to flow research, expanding beyond psychology into the study of motivation at work (Csikszentmihalyi, 2002) and updating foundational flow theory through classics. Among the 19 publications with 1000+ citations, Csikszentmihalyi authored three, despite the 2000-2024 focuss on new trends. Moon and Kim (2001) technology acceptance model extension promoting

Table 5
Flow-related publications with 1000 or more citations

Authors	Title	Year	Citations
Moon and Kim (2001)	Extending the TAM for a World-Wide-Web context	2001	6433
Koufaris (2002)	Applying the technology acceptance model and flow theory to online consumer behaviour	2002	5159
Novak et al. (2000)	Measuring the customer experience in online environments: A structural modelling approach	2000	5141
Nakamura and Csikszentmihalyi (2002)	The concept of flow	2002	4963
C.-L. Hsu and H.-P. Lu (2004)	Why do people play online games? An extended TAM with social influences and flow experience	2004	3275
Jennett et al. (2008)	Measuring and defining the experience of immersion in games	2008	2633
Shernoff et al. (2003)	Student engagement in high school classrooms from the perspective of flow theory.	2003	2470
Kiili (2005)	Digital game-based learning: Towards an experiential gaming model	2005	2347
Lee (2010)	Explaining and predicting users' continuance intention toward e-learning: An extension of the expectation-confirmation model	2010	1768
Chen (2007)	Flow in games (and everything else)	2007	1622
Hausman and Siekpe (2009)	The effect of web interface features on consumer online purchase intentions	2009	1558
Boyle et al. (2016)	An update to the systematic literature review of empirical evidence of the impacts and outcomes of computer games and serious games	2016	1535
Nakamura and Csikszentmihalyi (2009)	Flow theory and research	2009	1530
Csikszentmihalyi (2002)	Flow: The classic work on how to achieve happiness	2002	1474
Kuss and Griffiths (2011)	Internet gaming addiction: A systematic review of empirical research	2012	1470
Bakker (2005)	Flow among music teachers and their students: The crossover of peak experiences	2005	1327
Hoffman and Novak (2009)	Flow online: lessons learned and prospects	2009	1291
Sherry (2004)	Flow and media enjoyment	2004	1195
Parboteeah et al. (2009)	The influence of website characteristics on a consumer's urge to buy impulsively	2009	1161

website flow experiences tops citations. Many subsequent studies followed this direction, such as integrating TAM and flow in online shopping (Koufaris, 2002) and in online games (Hsu & Lu, 2004b). Online research in this period has attracted many citations, including studies on measuring online flow with structural modelling

(Novak et al., 2000) and digital game-based learning (Kiili, 2005). Building on flow foundations, these authors became trend leaders, a weakness of the Google Scholar data, which lacked collection criteria for deeper co-citation analysis, as discussed in the limitations section.

The second approach enabled a comprehensive analysis of author connections in the 3777 2000-2024 documents. Of 6167 authors, 1131 had two or more, and 248 had four or more publications. Kiili contributed the most with 23 works, followed by Oliveria. Despite ranking third with 15 publications, Csikszentmihalyi received only 12,643 citations from 2000 to 2024. Flow theory pioneer Nakamura ranked second with 7704 citations. Top publisher Kiili also had 4266 citations, ranking fourth after Hsu. Figure 3 details the author's bibliographic grouping.

Keyword Analysis

Keyword analysis can outline relationships among research topics (Zhang et al., 2024) using researchers' essential condensed idea codes to aid quick reader comprehension (Rose et al., 2010). This section uses the 14080 keywords from the second approach's 3777 documents to provide the most comprehensive 2000-2024 trend perspective. Of these, 422 keywords occurred at least ten times, and 228 at least 20 times. Table 6 lists the top 30 most frequent keywords. Flow-related terms, such as flow experience and flow state, dominate the literature review due to the keyword-based approach. Skill and challenge are the most common flow trigger prefixes, whereas clear goals and immediate feedback are less common. Flow dimensions were rarely considered, with only control in Table 6; an important future research proposal is

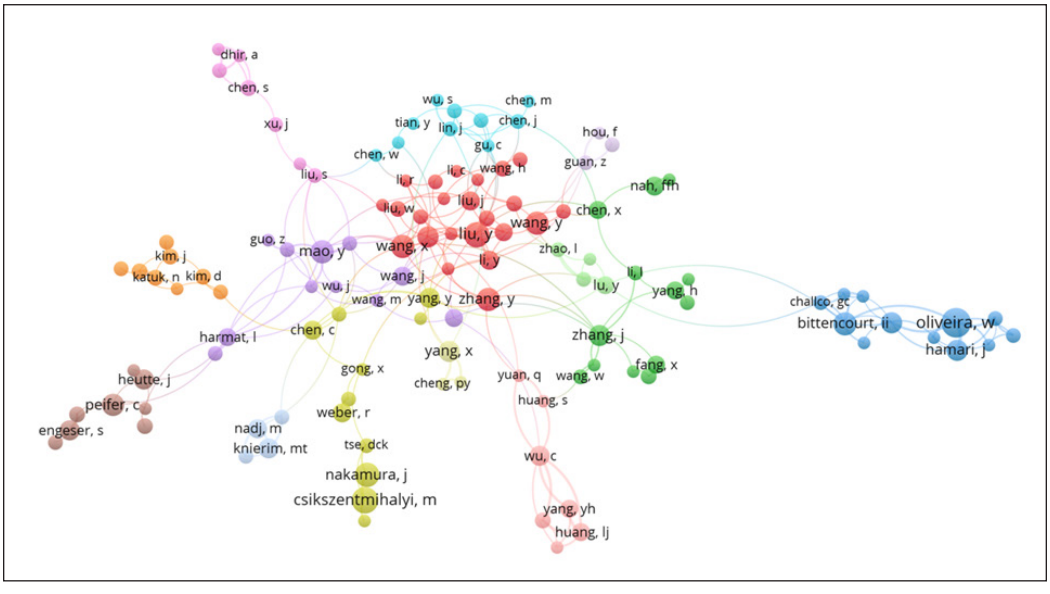

Figure 3. Bibliographic clustering

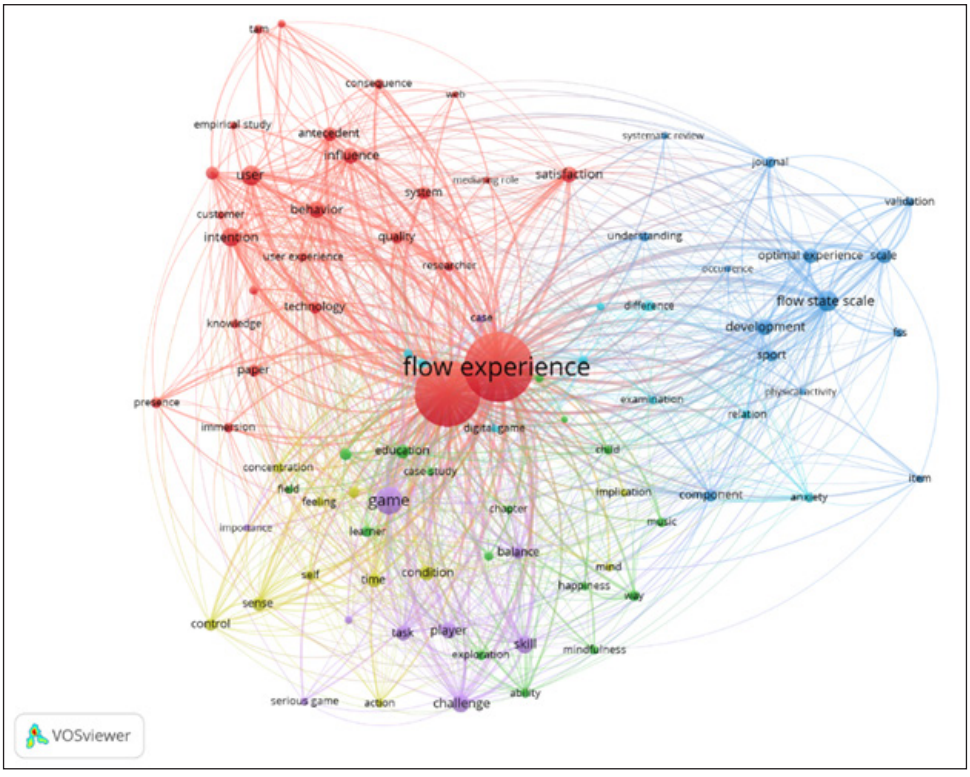

Figure 4. Cluster of keyword co-occurrence

Table 6
Top 30 most co-occurring keywords

Rank	Keywords	Frequency	Rank	Keywords	Frequency
1	flow experience	2890	16	scale	135
2	flow state	2554	17	condition	134
3	game	445	18	time	118
4	flow state scale	257	19	education	116
5	user	226	20	sense	114
6	intention	212	21	antecedent	110
7	challenge	208	22	consumer	103
8	skill	203	23	balance	101
9	behaviour	169	24	system	101
10	development	160	25	sport	93
11	player	151	26	control	88
12	influence	148	27	quality	88
13	satisfaction	148	28	gamification	87
14	optimal experience	136	29	technology	82
15	task	136	30	learner	79

Table 7
Summary of key research topic clusters

Cluster	Colour	Key keywords	Core research focuss
User-technology interaction	Red	User experience, satisfaction, intention, technology, system, acceptance	Understanding how digital interfaces (websites, apps) induce flow and how this influences technology acceptance (integration with TAM).
Education & personal development	Green	Education, learning, gamification, students, training, mindfulness	Application of flow to improve student engagement, primarily through game-based learning and intrinsic motivation strategies.
Flow state measurement	Blue	Flow state, scale, validity, measurement, optimal experience	Methodological research focussed on validating instruments like the Flow State Scale and defining the dimensions of the construct.
Gaming & immersion	Purple	Game, player, challenge, skill, enjoyment, serious games	Application of Csikszentmihalyi's channel model to game design; balancing difficulty to maintain player immersion.
Psychology & outcomes	Yellow/ Gold	Anxiety, achievement, depression, addiction, subjective well-being	The “dark side” of flow (gaming addiction) and the “light side” (happiness); flow as a buffer against anxiety or a driver of gaming disorder.

presented in the conclusion. The 2000-2024 context also shows prevalent keywords for games, learning, general work, and sports. Meanwhile, the subjects include users, players, or learners. However, not only the top 30, TAM, and self-determination theory were standard, but they were also represented in the Figure 4 analysis cluster.

VOSviewer's distinct colour clusters represent separate topics through synonym analysis. Using "flow experience" and "flow state", Figure 3's second approach mapping identified corresponding clusters.

The large red cluster (26 items) focusses on user research and technology concepts such as “user experience,” “satisfaction,” “behaviour,” “intention,” “technology,” and “systems,” as shown in Table 7, indicating an interest in understanding, and improving user experience with technology, a key research area in the 2000-2024 period. “Flow experience” is a focuss with many connections, demonstrating its interdisciplinary significance. “User experience” is also a focuss, emphasising user-centred research and development. Further analysis of the red cluster revealed the following:

- User-centric: Core keywords prioritise user experience, satisfaction, behaviour, and intentions, suggesting research on meeting user needs by measuring satisfaction, understanding behaviour, and predicting intentions.
- Technology acceptance: Research may explore factors influencing technology acceptance like knowledge, experience, and social factors.

- Technology's role in user experience: This cluster examines how technology can create positive user experiences, studying concepts like flow state and immersion to design more engaging systems.
- Experimental research methods in online flow experience: Keywords related to experimental research demonstrate the importance of real-world data and analysis to support conclusions on mediating roles of flow experience and technology's connection to users through flow.

The green cluster focusses on education, learning, and personal development, emphasising enjoyable, positive experiences. Keywords indicate an interest in utilising gamification to enhance learning, as well as the roles of positive emotions, mindfulness, and exploration in learning and development. Further explorations include formal and informal learning activities and processes centred around the learner and teacher. Game elements applied to non-game contexts can increase engagement and motivation from a flow perspective. Case studies should be considered for potential cross-disciplinary application. Beyond enhancing learner skills and happiness in learning, various methods to stimulate emotions and enhance mindfulness in flow states are needed. Music represents a proactive approach in learning towards personal development, exploring new paths to help learners perceive things anew. The blue cluster focusses on researching and understanding the flow state, a positive psychological state of complete focuss and immersion in an activity. Keywords signify interest in measuring, evaluating, and validating flow concepts and determining optimal experience factors. Topics in this cluster include further investigating the flow state by measuring, evaluating, and validating related concepts and identifying factors that create optimal experiences with implications across education, sports, and work. This cluster also covers the evaluation and validation of measurement tools, including the development of reliable flow-state scales, which are crucial for practical concept studies and applications.

The gold cluster centres on the concepts of individual subjective experience, including cognitive, emotional, and behavioural elements. The keywords indicate an interest in psychological processes such as attention, concentration, and control, as well as their interactions with emotions and actions. While crucial across fields, individual experience is particularly emphasised in psychology, where the gold cluster indicates how individuals experience the world and themselves through cognitive, emotional, and behavioural processes. Attention and concentration, expressed through focuss and maintenance abilities, can substantially impact performance, learning, and overall experience. Control sense is a key flow component that can influence motivation, self-esteem, and mental health.

Additionally, time is critical for studying human experiences and behaviours, as it can affect perception, feelings, and actions. The purple cluster revolved around

games and flow experience, emphasising Csikszentmihalyi's flow theory. Keywords denote interest in key elements that create flow in games, such as challenge-skill balance, task importance, and player roles. Additionally, the cluster refers to game applications in other domains, such as "serious games." This cluster demonstrates Csikszentmihalyi's seminal flow theory, an essential framework for understanding flow, especially in games, despite its recent emergence (2000). Flow antecedents also include challenge, an integral element in producing flow that requires player effort and skill. The next is skill, which refers to players' ability to address game challenges. However, flow values lie in balancing challenge and skill through specific game tasks and goals. Moreover, future trends should clarify the role of serious games in education, training, and behaviour change beyond entertainment. The blue cluster focusses on the relationship between video games, anxiety, achievement, and other psychological factors. Keywords imply an interest in exploring the impact of video games on players, particularly their emotions and academic performance. Future research should examine both the positive and negative aspects of video games, as well as factors that predict success and interest in other activities. Prominent themes include video games, the link between video game anxiety and achievement, interest, and motivation.

Figure 5 displays frequently co-occurring terms, including flow state scale (243), development (160), optimal experience (136), intention (127), and other common keywords, combining to represent the research area. Nodes denote keywords that appear at least 10 times (van Nunen et al., 2018), with node size indicating co-occurrence frequency. Based on the visual graph and related keywords in Figure 5, we can infer some psychological flow, optimal experience, and flow state research trends from 2000 to 2024:

Early Stage (2000-2010): Focussed on core concepts, with studies likely defining and measuring flow, exploring key components like challenge-skill balance, intense concentration, time awareness loss, and intrinsic rewards. Research targeted applications in education, sports, and art, where this experience was believed to significantly impact performance and creativity. The approach was often qualitative, potentially involving interviews, observations, and diaries to collect subjective data on flow experience.

Mid-stage (2011-2017): Expansion into new areas like the workplace, mental health, and technology to investigate flow's role in well-being and productivity. Increasing use of quantitative methods based on performance measurement. Quantitative methods, such as questionnaires and experiments, can objectively measure flow and test cause-and-effect hypotheses. Research here also emphasised individual factors, such as personality, motivation, and work environment/job design and feedback, that affect flow-state achievement.

Recent Period (2018-2024): Technology integration is the most helpful recent keyword. Research may explore how technologies such as digital games, virtual reality, and artificial intelligence can facilitate or enhance the experience of flow.

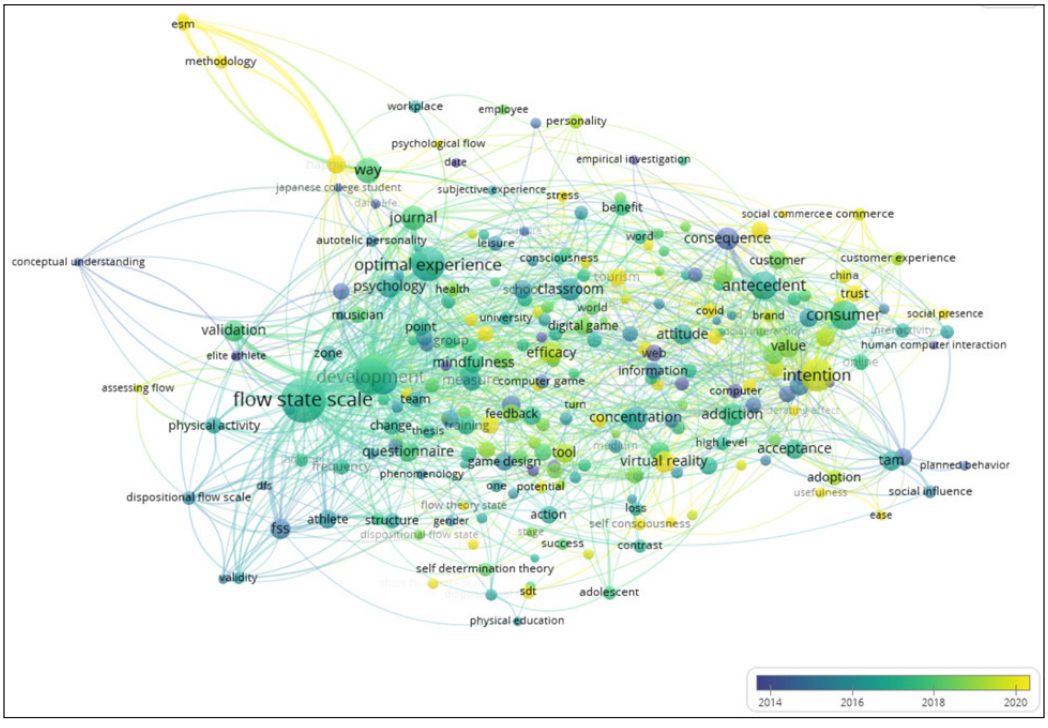

Figure 5. Keyword co-occurrence map (at least ten occurrences) from 2000 to 2024

Research orientations are often practical, focussed on developing flow-based interventions and training programmes to improve performance, well-being, and health. Growing interest in sustainable flow experiences has also led to a focuss on understanding flow among specific populations, such as children, the elderly, and those with mental health conditions.

Figure 6 provides an additional perspective showing the density of keywords on the VOSviewer application, which has been classified by frequency of use in the study. The density map for the 2000-2024 survey on flow experience is according to the second approach. According to this simulation, because they are depicted on the map with a darker yellow circle than other keywords, flow state and optimal experience are the concepts of most interest when studying flow. Meanwhile, customers are the subjects of most interest from the perspective of behavioural intentions, trust, and value brought to them. In addition, research trends, including virtual reality, game design, digital games, and tools, are highlighted in the conclusions in the previous section. The flow scale is also an issue to consider when the content value of flow has not been measured uniformly (Ozkara et al., 2017). Scale and the phrase flow state scale need to be more fully clarified in the context of the next trend when the flow value is expressed chiefly through control.

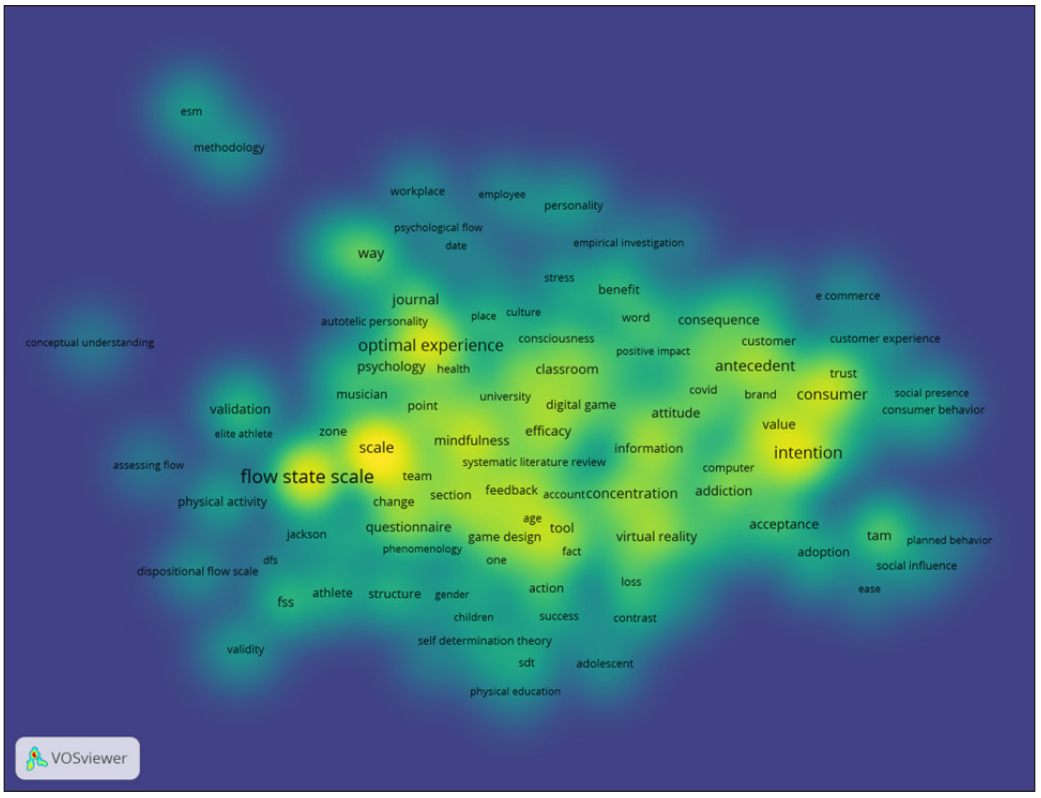

Figure 6. Keyword density map for flow

DISCUSSION

Interpreting bibliometric data requires a rigorous analysis that goes beyond mere description. By addressing the five initial research questions (RQs) and situating the findings within the broader academic discourse. This section elucidates the structural transformation of the flow study based on the previously summarised analytical results in Table 8.

The Trajectory of Flow: From Psychological Construct to Digital Metric (RQ1)

The first research question (RQ1) sought to identify current trends in flow experience studies. Our longitudinal analysis reveals a non-linear growth trajectory characterised by three distinct phases: foundational application (2000-2010), technological integration (2011-2019), and immersive acceleration (2020-2024).

The data indicate that while flow theory was first formulated in the 1970s by Csikszentmihalyi as a purely psychological framework for autotelic activity, its explosive growth in the 21st century is inextricably linked to the digitisation of daily life. The stable but moderate results observed between 2000 and 2010 reflect a period of theoretical transition, as scholars attempted to operationalise "optimal experience" as

Table 8
Summary of key research findings

Dimension	Key findings (2000-2024)	Theoretical implication & discussion
Research Trends	Exponential Growth (2020-2024): A massive surge in publications post-pandemic, driven by digital learning and immersive tech requirements.	Flow has evolved from a descriptive state to a prescriptive design goal. It is now a key element for digital systems, validating the technologisation of flow hypothesis.
Journal Distribution	Volume vs. impact divergence: Frontiers in Psychology leads in volume, but Computers in Human Behaviour leads in impact (average number of citations over 200).	The centre of gravity for flow research has shifted from Psychology ➔ HCI. Applied utility in technology adoption (TAM) drives citation impact more than theoretical refinement.
Publisher Landscape	High fragmentation: The top 10 journals account for less than 8% of total publication volume.	Flow is a “boundary object” used across diverse disciplines, but this fragmentation risks conceptual drift and measurement inconsistency across fields.
Influential Works	The application turn: While Czikszentmihalyi (1990) is foundational, Novak et al. (2000) and Kiili (2005) drive modern citations.	The most influential works are those that operationalise flow (measuring it in web use or games). Methodological papers that provide scales or models are the primary drivers of the field's evolution.
Evolution Drivers	TAM integration: Koufaris (2002), Moon and Kim (2001) successfully grafted flow onto the Technology Acceptance Model.	This integration has legitimised the flow in business and information systems research, transforming it from an aesthetic experience into a determinant of commercial success (purchase intention).

a variable in online consumer behaviour. This is an important transition period to consider when systematically compiling future literature, as the flow shifts from the arts and sports environment to the digital environment.

However, a pivotal inflection point occurred post-2014, followed by a dramatic surge in 2022 and 2023. This recent acceleration, which accounts for a significant portion of the total analysed volume, cannot be explained solely by academic interests. It is strongly correlated with two exogenous global factors. First, the rapid maturation of immersive technologies has necessitated a new metric for user engagement that goes beyond mere "satisfaction.” In these environments, flow is a prerequisite for their presence. Second, the COVID-19 pandemic forced a global migration to remote learning and work, prompting a surge in studies investigating how flow states could mitigate “Zoom fatigue” and sustain engagement in digital classrooms.

Critically, the discrepancy between our two data extraction approaches—where the broader keyword search (Method 2) yielded nearly twice as many documents

as the title-specific search (Method 1)—suggests a "diffusion effect". Flow is increasingly treated not as the sole subject of investigation but as a mediating variable in broader models of User Experience (UX) and educational psychology. This confirms that flow has successfully transitioned from a niche psychological theory to a ubiquitous construct in social science research.

Disciplinary Migration and Publication Venues (RQ2)

The analysis of journal and publisher distribution (RQ2) provides compelling evidence of a disciplinary migration. While flow originated in positive psychology, our findings show that the most influential conversations are now occurring in the domain of Human-Computer Interaction (HCI) and Educational Technology.

As explained in the results, the journal with the most published articles is indeed Frontiers in Psychology, indicating ongoing theoretical interest in the cognitive processes underlying the state of flow. Nevertheless, if one looks at the citation impact measured by TC/TP, the situation becomes somewhat reversed. Computers in Human Behaviour and Computers & Education show the highest citation impact, above 200 per paper. This signals a precise valuation by the academic community: research that applies flow to solve technological or pedagogical problems is currently more valued than research that merely describes it.

The publisher landscape further supports this shift. The dominance of Elsevier, Springer, and Taylor & Francis underscores the consolidation of flow research among major commercial publishers specialising in applied sciences. However, the findings summarised in Table 8 show that flow research remains a highly fragmented field. Flow research is beginning to emerge in journals such as Sustainability and the Journal of Retailing, indicating the breadth and, possibly, the fragmentation of the concept. In the absence of an umbrella journal that would oversee the dissemination of research on flow across various fields, the concept could develop multiple definitions, none of which overlap. This would create an irony in which researchers and psychologists would refer to the same phenomenon.

The Intellectual Base: Foundational Works and Field Evolution (RQ3)

Addressing RQ3, the citation analysis reveals that the field's evolution has been shaped more by methodological operationalisation than by new theoretical discoveries. While Mihaly Csikszentmihalyi remains the spiritual figurehead of the movement, the engine room of modern flow research comprises authors who have adapted his theory for the digital age.

The enduring dominance of Novak et al. (2000) cannot be overstated. By developing a structural equation model to measure online customer experience, they provided a methodological toolkit that enabled thousands of subsequent studies to quantify flow. This publication effectively unlocked the construct for quantitative social science, moving it beyond qualitative interviews with artists and rock climbers. Similarly, the

high citation count for Kiili (2005) marks the formal entry of flow into the serious game's movement. Kiili's experiential gaming model provided the theoretical justification for gamification in education, arguing that the "challenge-skill balance" is synonymous with the "zone of proximal development" in pedagogy.

It is important to note that while these works have shaped the field's development, they have also constrained it. The overreliance on early web-based models and Jackson and Eklund's scales means that much of the field is still using measurement tools designed for the "Web 1.0 era to study Web 3.0" phenomena. This reliance on older tools can limit the ability to capture the nuances of flow in highly immersive, multisensory environments like the Metaverse, where "telepresence" and "embodiment" play a larger role than in early web navigation.

Thematic Clusters and Comparative Analysis (RQ4)

The keyword co-occurrence analysis (RQ4) identified five distinct clusters: (1) User-Technology Interaction, (2) Education & Gamification, (3) Measurement, (4) Gaming, and (5) Psychology & Outcomes. To rigorously contextualise these themes, Tables 8 and 9 provide a comparative analysis with major prior reviews.

As illustrated in Table 9, this study diverges from niche reviews such as Tan and Sin (2019) and deMatos et al. (2021) by identifying "Gamification" and "User-Tech Interaction" as the central nervous system of modern flow research, rather than merely peripheral applications. Furthermore, the identification of the "Psychology & Outcomes" cluster (Gold) provides a critical counter-narrative often missed in purely technocentric reviews: the link between flow, anxiety, and digital addiction. Zhang et al. (2024) identifies "Gaming" and "Education" as central themes. However, they miss the nuance of the "Dark Side" (Gold Cluster - Anxiety/Addiction) that our Google Scholar data highlights.

Future Research Directions (RQ5)

The persistence of the "measurement" cluster highlights the limitations of questionnaires. As indicated by recent work on snippets, the future lies in objective flow detection. Current scales only measure flow at a moment. Researchers have increasingly called for the use of neuroimaging and heart rate sensors to capture the onset of flow in real time. However, this is not appropriate for research on digitising user experiences, as it may compromise research ethics in fast-paced business environments. This "physio-flow" approach addresses the paradox that stopping a user from asking "are you in flow?" destroys the flow state.

The "dark side" cluster suggests an urgent need to study the ethics of flow. With algorithms explicitly designed to induce and sustain flow to maximise ad revenue, social scientists must investigate the weaponisation of flow. Future studies should explore the boundary between healthy immersion and pathological dissociation and develop "digital wellness" frameworks that help users regulate their flow.

Table 9
Comparative analysis of bibliometric reviews on flow experience

Feature	Current Study	Zhang et al. (2024)	Tan and Sin (2019)	deMatos et al. (2021)
Timeframe	2000-2024 (Most current)	1982-2021	1975-2019	Up to 2021
Data source	Google Scholar (3,777 docs)	Scopus (2,622 docs)	Multiple sources (95 selected docs)	Multiple sources (185 selected docs)
Scope	Broad Social Sciences (Comprehensive)	Multidisciplinary (Scopus indexed only)	Niche: Music Context	Niche: Tourism & Hospitality
Primary method	VOSviewer, Dual Strategy	CiteSpace, VOSviewer	Systematic review, Content analysis	Systematic review, Theory extension
Dominant themes	1. User-Tech Interaction 2. Education, Gamification 3. Measurement (Scales) 4. Cognitive Experience 5. Anxiety	1. Technology 2. Games 3. Sports 4. Creativity 5. Education 6. Mechanism 7. Positivity 8. Health	1. Performance anxiety vs. Flow 2. Psychophysiology 3. Group flow 4. Music education	1. Experiences capes 2. Immersion 3. Visitor satisfaction 4. Behavioural intention
Findings on "Tech"	Central driver of research (TAM integration).	Identified as a supreme theme alongside gaming.	Not a primary focuss; focussed on audio/performance.	Focuss on VR and smart tourism as facilitators.
Unique contribution	Captures post-COVID surge (2022-2024); validates use of Google Scholar for broader social science coverage.	Long-term historical view (40 years); robust national/regional collaboration analysis.	Deep dive into auditory and performance aspects of flow; distinguishes flow from mere pleasure.	Extends flow theory into Service Dominant Logic and destination management.
Noted limitations	Google Scholar data may contain noise or lower quality citations.	Scopus excludes many social science books and niche journals.	Limited to music; small sample size.	Limited to tourism; qualitative focuss.

Most research focusses on individuals (solitary flow). Future research should expand on Tan and Sin's, "group flow" concepts but apply them to remote teams and digital collaborations. How does a distributed team experience synchrony and flow in a Zoom meeting or collaborative coding environment?

CONCLUSION

This bibliometric analysis of 3,777 documents represents one of the most exhaustive reviews of flow experience research in social sciences to date. Our findings confirm that flow has evolved from a niche psychological concept into a foundational pillar of the digital experience

economy. The technologisation of flow is the defining trend of the last two decades, with the field migrating from the study of artists and athletes to the analysis of gamers, learners, and online consumers.

This study contributes to the literature by identifying the specific mechanisms of this evolution: integration with the Technology Acceptance Model (TAM), the rise of gamification in education, and the recent pivot toward immersive metaverse environments. We have demonstrated that while the theoretical core of flow (the challenge-skill balance) remains stable, its application has become highly fragmented across diverse disciplines.

Theoretically, this study challenges the reliance on legacy measurement scales and advocates a shift toward psychophysiological and behavioural metrics that match the speed of modern digital interaction. Practically, the results suggest that educators and designers must move beyond "gamification" (adding points/badges) to "flow design" (balancing cognitive load and skill) to achieve genuine engagement.

In conclusion, the future of flow research lies not in simply replicating Csikszentmihalyi's findings in new contexts but in fundamentally reimagining the construct for a sustainable, algorithmic, and neuroconnected world. The question is no longer "what is flow?" but "how do we design flow that enhances, rather than consumes, human attention?"

Limitations and Future Research

With the initial research goal of answering five basic research questions to shape research trends on flow in the new context, following the suggestions of Zhang et al. (2024), we used Google Scholar rather than other databases. The data source, collected from 2000 to 2024, is based on the emergence of many studies on online flow experiences during this period. The research results also show that the technological context aligns with the trend of flow experiences; however, other aspects grounded in Csikszentmihalyi's foundation continue to be explored over 25 years of observation. This study provides a relatively unique approach to the collected database system. We have provided two methods, or more precisely, two data approaches, from which to offer perspectives different from those in other studies. Although comprehensive, publications collected on Google Scholar are less reliable than those in Scopus and WoS.

Moreover, collecting data from these two platforms will provide a more comprehensive set of criteria for conducting in-depth analyses, such as co-citation and bibliographic coupling analyses. Regarding the data approach, future studies should either merge databases from the two platforms, Scopus and WOS, or implement a more effective document filtering system to identify reputable documents in Google Scholar. The content of flow experience can also focuss on narrower aspects, such as the online flow experience, in the context of technology, such as human-computer interaction.

ACKNOWLEDGEMENTS

The authors acknowledge the editorial team, who processed this research

paper. The authors received no financial support for the research, authorship, and publication of this article.

REFERENCE

Al Oraini, B. (2024). Self-determination and intention to adopt massive open online courses (MOOCs) for professional development. *E-learning and Digital Media*. Advance online publication. https://doi.org/10.1177/20427530241256338

Bakker, A. B. (2005). Flow among music teachers and their students: The crossover of peak experiences. *Journal of Vocational Behaviour, 66*(1), 26-44. https://doi.org/10.1016/j.jvb.2003.11.001

Beard, K. S. (2015). Theoretically speaking: An interview with Mihaly Csikszentmihalyi on flow theory development and its usefulness in addressing contemporary challenges in education. *Educational Psychology Review, 27*(2), 353-364. https://doi.org/10.1007/s10648-014-9291-1

Biasutti, M. (2011). Flow and optimal experience. In *Encyclopedia of creativity* (2nd ed., Vol. 1, pp. 522-528). Elsevier. https://doi.org/10.1016/B978-0-12-375038-9.00099-6

Biasutti, M. (2016). Flow and optimal experience. In *The curated reference collection in neuroscience and biobehavioural psychology* (pp. 522-528). Elsevier. https://doi.org/10.1016/B978-0-12-809324-5.06191-5

Boyle, E. A., Hainey, T., Connolly, T. M., Gray, G., Earp, J., Ott, M., Lim, T., Ninaus, M., Ribeiro, C., & Pereira, J. (2016). An update to the systematic literature review of empirical evidence of the impacts and outcomes of computer games and serious games. *Computers & Education, 94*, 178-192. https://doi.org/10.1016/j.compedu.2015.11.003

Chen, J. (2007). Flow in games (and everything else). *Communications of the ACM, 50*(4), 31-34. https://doi.org/10.1145/1232743.1232769

Chilton, G. (2013). Art therapy and flow: A review of the literature and applications. *Art Therapy, 30*(2), 64-70. https://doi.org/10.1080/07421656.2013.787211

Cseh, G. M. (2016). Flow in creativity: A review of potential theoretical conflict. In *Flow experience: Empirical research and applications* (pp. 79-94). Springer. https://doi.org/10.1007/978-3-319-28634-1_6

Csikszentmihalyi, M. (1997). *Flow and the psychology of discovery and invention*. HarperPerennial.

Csikszentmihalyi, M. (2002). *Flow: The classic work on how to achieve happiness*. Rider.

Csikszentmihalyi, M., & Figurski, T. J. (1982). Self-awareness and aversive experience in everyday life. *Journal of Personality, 50*(1), 15-19. https://doi.org/10.1111/j.1467-6494.1982.tb00742.x

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. Harper & Row.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319-340. https://doi.org/10.2307/249008

de Matos, N., Sá, E. S. D., & Duarte, P. A. D. O. (2021). A review and extension of the flow experience concept: Insights and directions for tourism research. *Tourism Management Perspectives, 38*, Article 100802. https://doi.org/10.1016/j.tmp.2021.100802

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research, 133*, 285-296. https://doi.org/10.1016/j.jbusres.2021.04.070

Falagas, M. E., Pitsouni, E. I., Malietzis, G. A., & Pappas, G. (2008). Comparison of PubMed, Scopus, Web of Science, and Google Scholar: Strengths and weaknesses. *FASEB Journal, 22*(2), 338-342. https://doi.org/10.1096/fj.07-9492LSF

Gusenbauer, M. (2019). Google Scholar to overshadow them all? Comparing the sizes of 12 academic search engines and bibliographic databases. *Scientometrics, 118*(1), 177-214. https://doi.org/10.1007/s11192-018-2958-5

Halevi, G., Moed, H., & Bar-Ilan, J. (2017). Suitability of Google Scholar as a source of scientific information and as a source of data for scientific evaluation: Review of the literature. *Journal of Informetrics, 11*(3), 823-834. https://doi.org/10.1016/j.joi.2017.06.005

Harzing, A.-W. (2007). *Publish or perish* [Computer software]. Harzing.com. https://harzing.com/resources/publish-or-perish

Hausman, A. V., & Siekpe, J. S. (2009). The effect of web interface features on consumer online purchase intentions. *Journal of Business Research, 62*(1), 5-13. https://doi.org/10.1016/j.jbusres.2008.01.018

Hoffman, D. L., & Novak, T. P. (1996). Marketing in hypermedia computer-mediated environments: Conceptual foundations. *Journal of Marketing, 60*(3), 50-68. https://doi.org/10.2307/1251841

Hoffman, D. L., & Novak, T. P. (2009). Flow online: Lessons learned and future prospects. *Journal of Interactive Marketing, 23*(1), 23-34. https://doi.org/10.1016/j.intmar.2008.10.003

Hsu, C.-L., & Lu, H.-P. (2004). Why do people play online games? An extended TAM with social influences and flow experience. *Information & Management, 41*(7), 853-868. https://doi.org/10.1016/j.im.2003.08.014

Ishimura, I., & Kodama, M. (2009). Flow experiences in everyday activities of Japanese college students: Autotelic people and time management. *Japanese Psychological Research, 51*(1), 47-54. https://doi.org/10.1111/j.1468-5884.2009.00387.x

Jennett, C., Cox, A. L., Cairns, P., Dhoparee, S., Epps, A., Tijs, T., & Walton, A. (2008). Measuring and defining the experience of immersion in games. *International Journal of Human-Computer Studies, 66*(9), 641-661. https://doi.org/10.1016/j.ijhcs.2008.04.004

Kiili, K. (2005). Digital game-based learning: Towards an experiential gaming model. *The Internet and Higher Education, 8*(1), 13-24. https://doi.org/10.1016/j.iheduc.2004.12.001

Kim, D., & Ko, Y. J. (2019). The impact of virtual reality (VR) technology on sport spectators' flow experience and satisfaction. *Computers in Human Behaviour, 93*, 346-356. https://doi.org/10.1016/j.chb.2018.12.040

Koufaris, M. (2002). Applying the technology acceptance model and flow theory to online consumer behaviour. *Information Systems Research, 13*(2), 205-223. https://doi.org/10.1287/isre.13.2.205.83

Kuss, D. J., & Griffiths, M. D. (2011). Internet gaming addiction: A systematic review of empirical research. *International Journal of Mental Health and Addiction, 10*(2), 278-296. https://doi.org/10.1007/s11469-011-9318-5

Kuss, D. J., & Griffiths, M. D. (2012). Internet gaming addiction: A systematic review of empirical research. *International Journal of Mental Health and Addiction, 10*(2), 278-296. https://doi.org/10.1007/s11469-011-9318-5

Lambert, J., Chapman, J., & Lurie, D. (2013). Challenges to the four-channel model of flow: Primary assumptions of flow support the moderate challenge-control channel. *Journal of Positive Psychology, 8*(5), 395-403. https://doi.org/10.1080/17439760.2013.809138

Lee, M.-C. (2010). Explaining and predicting users' continuance intention towards e-learning: An extension of the expectation-confirmation model. *Computers & Education, 54*(2), 506-516. https://doi.org/10.1016/j.compedu.2009.09.002

Lim, W. M., & Kumar, S. (2023). Guidelines for interpreting the results of bibliometric analysis:

A sensemaking approach. *Global Business and Organisational Excellence, 43*(2), 17-26. https://doi.org/10.1002/joe.22229

Lin, Y.-L., Wang, W.-T., Kuo, C.-C., & Chen, P.-H. (2025). Motivational incentives in the context of online game-based formative assessment and improved student learning performance. *Education and Information Technologies, 30*(4), 4669-4694. https://doi.org/10.1007/s10639-024-12974-8

Maheshwari, A. K., Ravindran, D., Gurubatham, M., & Maheshwari, N. (2023). Reducing the barriers to flow experience through development of consciousness. In *The Palgrave handbook of fulfilment, wellness, and personal growth at work* (pp. 607-624). Palgrave Macmillan. https://doi.org/10.1007/978-3-031-35494-6_32

Martín-Martín, A., Orduna-Malea, E., Thelwall, M., & Delgado López-Cózar, E. (2018). Google Scholar, Web of Science, and Scopus: A systematic comparison of citations in 252 subject categories. *Journal of Informetrics, 12*(4), 1160-1177. https://doi.org/10.1016/j.joi.2018.09.002

Miguel, S., Tannuri de Oliveira, E., & Cabrini Grácio, M. (2016). Scientific production on open access: A worldwide bibliometric analysis in the academic and scientific context. *Publications, 4*(1), Article 1. https://doi.org/10.3390/publications4010001

Mongeon, P., & Paul-Hus, A. (2015). The journal coverage of Web of Science and Scopus: A comparative analysis. *Scientometrics, 106*(1), 213-228. https://doi.org/10.1007/s11192-015-1765-5

Moon, J.-W., & Kim, Y.-G. (2001). Extending the TAM for a World Wide Web context. *Information & Management, 38*(4), 217-230. https://doi.org/10.1016/S0378-7206(00)00061-6

Nakamura, J., & Csikszentmihalyi, M. (2002). The concept of flow. In *Handbook of positive psychology* (pp. 89-105). Oxford University Press.

Nakamura, J., & Csikszentmihalyi, M. (2009). Flow theory and research. In *Handbook of positive psychology* (2nd ed., pp. 195-206). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780195187243.013.0018

Novak, T. P., Hoffman, D. L., & Yung, Y.-F. (2000). Measuring the customer experience in online environments: A structural modelling approach. *Marketing Science, 19*(1), 22-42. https://doi.org/10.1287/mksc.19.1.22.15184

Ozkara, B. Y., Ozmen, M., & Kim, J. W. (2017). Examining the effect of flow experience on online purchase: A novel approach to flow theory based on hedonic and utilitarian value. *Journal of Retailing and Consumer Services, 37*, 119-131. https://doi.org/10.1016/j.jretconser.2017.04.001

Pace, S. (2004). A grounded theory of the flow experiences of web users. *International Journal of Human-Computer Studies, 60*(3), 327-363. https://doi.org/10.1016/j.ijhcs.2003.08.005

Palomäki, J., Tammi, T., Lehtonen, N., Seittenranta, N., Laakasuo, M., Abuhamdeh, S., Lappi, O., & Cowley, B. U. (2021). The link between flow and performance is moderated by task experience. *Computers in Human Behaviour, 124*, Article 106891. https://doi.org/10.1016/j.chb.2021.106891

Parboteeah, D. V., Valacich, J. S., & Wells, J. D. (2009). The influence of website characteristics on a consumer's urge to buy impulsively. *Information Systems Research, 20*(1), 60-78. https://doi.org/10.1287/isre.1070.0157

Passas, I. (2024). Bibliometric analysis: The main steps. *Encyclopedia, 4*(2), 1014-1025. https://doi.org/10.3390/encyclopedia4020065

Perttula, A., Kiili, K., Lindstedt, A., & Tuomi, P. (2017). Flow experience in game-based learning:

A systematic literature review. *International Journal of Serious Games, 4*(1), Article 151. https://doi.org/10.17083/ijsg.v4i1.151

Punj, N., Ahmi, A., Tanwar, A., & Abdul Rahim, S. (2023). Mapping the field of green manufacturing: A bibliometric review of the literature and research frontiers. *Journal of Cleaner Production, 423*, Article 138729. https://doi.org/10.1016/j.jclepro.2023.138729

Rose, S., Engel, D., Cramer, N., & Cowley, W. (2010). Automatic keyword extraction from individual documents. In *Text mining: Applications and theory* (pp. 1-20). John Wiley & Sons. https://doi.org/10.1002/9780470689646.ch1

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*(1), 68-78. https://doi.org/10.1037/0003-066X.55.1.68

Seligman, M. E. P., & Csikszentmihalyi, M. (2000). Positive psychology: An introduction. *American Psychologist, 55*(1), 5-14. https://doi.org/10.1037/0003-066X.55.1.5

Shernoff, D. J., Csikszentmihalyi, M., Schneider, B., & Shernoff, E. S. (2003). Student engagement in high school classrooms from the perspective of flow theory. *School Psychology Quarterly, 18*(2), 158-176. https://doi.org/10.1521/scpq.18.2.158.21860

Sherry, J. L. (2004). Flow and media enjoyment. *Communication Theory, 14*(4), 328-347. https://doi.org/10.1111/j.1468-2885.2004.tb00318.x

Swann, C., Piggott, D., Schweickle, M., & Vella, S. A. (2018). A review of scientific progress in flow in sport and exercise: Normal science, crisis, and a progressive shift. *Journal of Applied Sport Psychology, 30*(3), 249-271. https://doi.org/10.1080/10413200.2018.1443525

Tan, L., & Sin, H. X. (2019). Flow research in music contexts: A systematic literature review. *Musicae Scientiae, 25*(4), 399-428. https://doi.org/10.1177/1029864919877564

van Nunen, K., Li, J., Reniers, G., & Ponnet, K. (2018). Bibliometric analysis of safety culture research. *Safety Science, 108*, 248-258. https://doi.org/10.1016/j.ssci.2017.08.011

Zhang, Y., Wang, F., & Farb, N. (2024). Developments and trends in flow research over 40 years: A bibliometric analysis. *Collabra: Psychology, 10*(1), 1-17. https://doi.org/10.1525/collabra.92948