

PERSPECTIVE OF USER MOTIVATION AND SATISFACTION AS KEY DRIVERS OF KNOWLEDGE TRANSFER IN NANO-LEARNING*

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Abstract

This research aims to: 1) to examine the influence of user motivation on engagement in nano-learning environments. 2) to investigate the effect of user satisfaction on engagement and subsequent learning effectiveness. 3) to analyze the mediating roles of engagement and watch time in facilitating knowledge transfer on short-form video platforms. Data were collected from 538 Chinese users aged 18–35 familiar with nano-learning on short video platforms. All variables were measured using five-point Likert scales adapted from prior studies. Data from [N] participants were analyzed using SEM.

Results show that: (1) motivation ($\beta = 0.459$) and satisfaction ($\beta = 0.428$) enhance engagement; (2) engagement affects watch time ($\beta = 0.362$) and learning effectiveness ($\beta = 0.256$), while watch time has the strongest effect ($\beta = 0.750$); (3) the model explains substantial variance ($R^2 = 0.683, 0.592, 0.562$).

Keywords: Nano-learning, Distance Learning, Education, The short videos, Driving Factors

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Introduction

In the digital era characterized by rapid technological advancement and shortened attention spans, traditional learning models are increasingly challenged to meet the evolving needs of learners. This shift has led to the emergence of nano-learning, a pedagogical approach that delivers highly focused, bite-sized learning units designed for quick consumption and immediate application. Nano-learning is particularly relevant in mobile and just-in-time learning environments, where users seek concise, relevant, and engaging knowledge experiences (Hug, 2005; Buchem & Hamelmann, 2010).

Despite its growing adoption, a critical issue persists: the effectiveness of nano-learning in facilitating meaningful knowledge transfer. Knowledge transfer refers to the ability of learners to apply acquired knowledge or skills in new or practical contexts (Argote & Ingram, 2000). While nano-learning excels in accessibility and flexibility, concerns remain regarding whether fragmented content can support deep understanding and long-term retention. This raises an important research problem—identifying the key factors that enhance knowledge transfer within nano-learning environments.

Among the various influencing factors, user motivation and satisfaction have emerged as central determinants. Motivation, particularly intrinsic motivation, plays a crucial role in driving engagement, persistence, and cognitive investment in learning activities (Deci & Ryan, 2000). In nano-learning contexts, where content is brief and often self-directed, learners must rely heavily on internal motivation to initiate and complete learning tasks. Without sufficient motivation, even well-designed nano-content may fail to produce meaningful learning outcomes.

Similarly, user satisfaction defined as the learner's perceived value and positive evaluation of the learning experience has a direct impact on continued usage and knowledge application. According to the Expectation-Confirmation

Model (ECM), satisfaction influences users' intention to continue using a system, which in turn affects cumulative learning and knowledge transfer (Bhattacharjee, 2001). In nano-learning platforms, satisfaction is closely linked to factors such as content relevance, usability, personalization, and immediate feedback.

The intersection of motivation and satisfaction becomes even more significant when viewed through the lens of self-determined learning (heutagogy) and user-centered design. Nano-learning environments often empower learners to control the pace, sequence, and context of their learning, aligning with principles of autonomy and competence—key components of Self-Determination Theory (Deci & Ryan, 2000). When learners feel autonomous and competent, their motivation increases, leading to deeper engagement and more effective knowledge transfer.

Furthermore, advances in digital platforms and artificial intelligence have enabled the personalization of nano-learning experiences, enhancing both motivation and satisfaction. Adaptive learning systems can tailor content based on user preferences, prior knowledge, and performance, thereby increasing perceived relevance and engagement (Khalil & Ebner, 2016). This personalization is essential for sustaining learner interest in micro-content formats and ensuring that knowledge is not only consumed but also applied.

However, empirical research specifically examining how motivation and satisfaction jointly influence knowledge transfer in nano-learning contexts remains limited. Most existing studies focus on microlearning effectiveness or user engagement separately, without integrating these constructs into a comprehensive framework. This gap highlights the need for a more holistic understanding of the psychological and experiential factors that drive successful learning outcomes in nano-learning environments.

Therefore, the significance of this study lies in its potential to:

1. Advance theoretical understanding by integrating motivation and satisfaction into knowledge transfer models within nano-learning.

2. Inform instructional design by identifying key elements that enhance learner engagement and application of knowledge.

3. Support digital education strategies by providing evidence-based insights for designing effective nano-learning platforms.

4. Contribute to lifelong learning and workforce development, where rapid, flexible, and effective learning solutions are increasingly essential.

In conclusion, as nano-learning continues to gain prominence in both formal and informal education, understanding the roles of user motivation and satisfaction becomes critical. These factors not only influence learner engagement but also determine whether knowledge is effectively transferred and applied, ultimately shaping the success of nano-learning as a transformative educational approach.

Objectives

1. To examine the influence of user motivation on engagement in nano-learning environments.

2. To investigate the effect of user satisfaction on engagement and subsequent learning effectiveness.

3. To analyze the mediating roles of engagement and watch time in facilitating knowledge transfer on short-form video platforms.

Literature Review

Knowledge Transfer

Knowledge transfer refers to the process through which knowledge is communicated, understood, and applied (Nagy & Duma, 2023). In digital learning environments, it is influenced by both psychological factors and user interaction with content. Prior research highlights motivation, engagement, and satisfaction

as key determinants, yet their roles in short-form nano-learning contexts remain underexplored.

User Motivation

Motivation drives learning behavior and persistence (Marin & Marin, 2024). In digital contexts, motivated learners show higher engagement and stronger commitment. In nano-learning, motivation is expected to increase interaction with short video content and facilitate learning.

User Satisfaction

User satisfaction reflects learners' evaluation of their learning experience. While it is associated with continued usage, its effect on learning outcomes is often indirect, particularly in short-form environments where superficial consumption may occur (Vijayakumar & Jagatheeshkumar, 2024).

User Engagement

Engagement represents cognitive and behavioral involvement in learning (Kim & Yu, 2020). In short video contexts, it includes attention, interaction, and repeated exposure, and is closely linked to deeper information processing.

Short Video Watch Time

Watch time reflects sustained interaction with video content and serves as a behavioral indicator of attention. Longer viewing duration provides greater opportunity for information processing, making it a key mechanism linking engagement to knowledge transfer.

Hypotheses

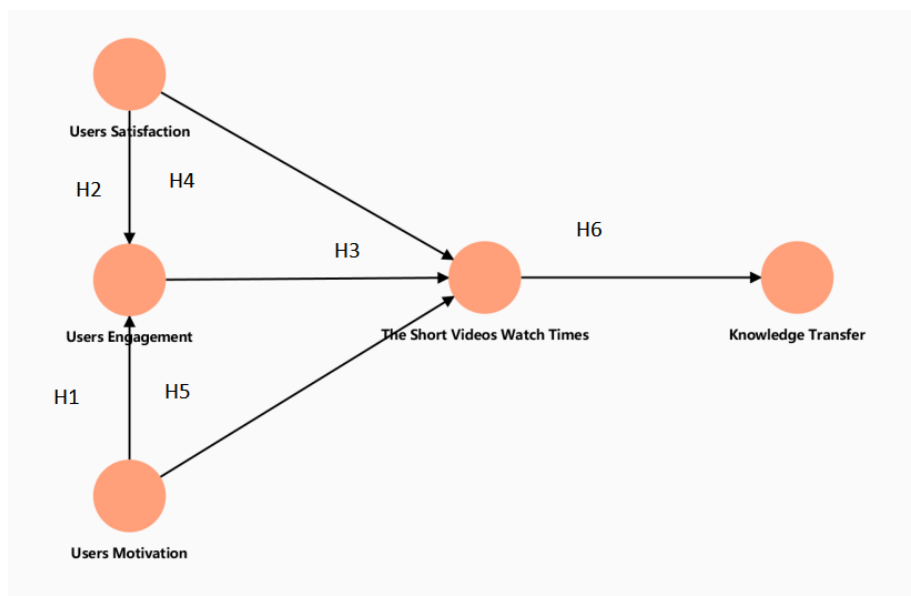


Figure 1 The Illustration of Hypotheses Development

This study proposes a model linking motivation and satisfaction to knowledge transfer through engagement and watch time.

H1: Motivation → Engagement

H2: Satisfaction → Engagement

H3: Engagement → Watch Time → Learning Effectiveness

H4: Satisfaction → Engagement → Learning Effectiveness

H5: Motivation → Engagement → Learning Effectiveness

H6: Watch Time → Learning Effectiveness

Methodology

1. Research Design

This study employed a quantitative research approach using a cross-sectional survey design to examine the relationships among user motivation, satisfaction, engagement, watch time, and learning effectiveness in nano-learning environments. The design is appropriate for testing causal relationships and validating theoretical models through statistical analysis.

2. Population and Sample

The target population consisted of Chinese users aged 18–35 who were familiar with nano-learning through short video platforms.

- A total of 553 respondents participated in the survey.
- After data screening and cleaning, 538 valid responses were retained for analysis.

The sample reflects active users of short video-based nano-learning platforms, ensuring relevance to the research context.

3. Data Collection Instrument

Data were collected a structured questionnaire composed of previously validated measurement scales adapted from prior studies.

- All variables were measured using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree).
- The questionnaire included constructs for:
 - User Motivation
 - User Satisfaction
 - User Engagement
 - Watch Time
 - Learning Effectiveness

4. Data Analysis Technique

The study employed Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS software due to:

- Non-normal data distribution

Predictive and exploratory nature of the model

Key procedures included:

1. Measurement Model Evaluation (reliability and validity)
2. Structural Model Assessment (path coefficients, R^2 values)
3. Bootstrapping (5,000 resamples) to test:
 - Hypothesis significance
 - Mediation effects

Results

The findings of this study reveal clear relationships among user motivation, satisfaction, engagement, watch time, and learning effectiveness in nano-learning environments.

First, the structural model analysis shows that user motivation ($\beta = 0.459$) and user satisfaction ($\beta = 0.428$) both have a significant positive effect on user engagement. This indicates that learners who are more motivated and satisfied with nano-learning platforms are more likely to actively engage with the learning content.

Second, user engagement plays a crucial role in influencing both behavioral and learning outcomes. Specifically, engagement significantly affects watch time ($\beta = 0.362$) and also has a direct positive effect on learning effectiveness ($\beta = 0.256$). This suggests that engaged learners not only spend more time interacting with short video content but also achieve better learning outcomes.

Third, among all variables, watch time emerges as the strongest predictor of learning effectiveness ($\beta = 0.750$). This finding highlights that sustained exposure to learning content is more critical than initial engagement alone. In nano-learning contexts, longer viewing duration allows for deeper cognitive processing and more effective knowledge transfer.

In addition, the model demonstrates strong explanatory power. It explains 68.3% of the variance in engagement ($R^2 = 0.683$), 59.2% in watch time ($R^2 = 0.592$), and 56.2% in learning effectiveness ($R^2 = 0.562$), indicating that the proposed model is robust and effective in predicting learning outcomes.

Furthermore, mediation analysis confirms that:

Engagement mediates the relationship between motivation and learning effectiveness (indirect effect = 0.1175).

Watch time further strengthens this mediation pathway (indirect effect = 0.165), reinforcing its critical role as a behavioral mechanism linking engagement to learning outcomes.

Overall, the results demonstrate that motivation and satisfaction influence knowledge transfer indirectly through engagement and watch time, with watch time being the most influential factor in determining learning effectiveness in nano-learning environments.

Discussion

The findings of this study provide important insights into the mechanisms underlying knowledge transfer in nano-learning environments, particularly on short-form video platforms. The results confirm that user motivation and satisfaction are key antecedents of engagement, which in turn influences learning effectiveness both directly and indirectly through watch time.

First, the significant effect of motivation on engagement ($\beta = 0.459$) aligns with prior studies suggesting that motivation is a fundamental driver of learning

behavior and persistence in digital environments. For example, Marin and Marin (2024) emphasized that motivated learners are more likely to actively participate and sustain involvement in learning activities. In the context of nano-learning, this study extends their findings by demonstrating that even in short, fragmented learning formats, motivation remains a critical factor in stimulating user interaction with content.

Similarly, user satisfaction was found to significantly influence engagement ($\beta = 0.428$), supporting the notion that positive learning experiences encourage continued interaction. This finding is consistent with Vijayakumar and Jagatheeshkumar (2024), who argued that satisfaction enhances users' willingness to engage with digital learning systems. However, the present study reveals that satisfaction does not directly translate into learning effectiveness but operates indirectly through engagement and behavioral mechanisms, highlighting the importance of intermediary variables.

Second, the role of engagement as a mediator is clearly supported. Engagement significantly affects both watch time ($\beta = 0.362$) and learning effectiveness ($\beta = 0.256$). This finding reinforces the conceptualization of engagement as a bridge between psychological factors (motivation and satisfaction) and learning outcomes, as suggested by Kim and Yu (2020). However, the relatively moderate direct effect of engagement on learning effectiveness indicates that engagement alone may not be sufficient to ensure effective knowledge transfer in nano-learning contexts.

A key contribution of this study is the identification of watch time as the most influential predictor of learning effectiveness ($\beta = 0.750$). This result suggests that sustained exposure to content is more critical than initial engagement or interest. In line with Nagy and Duma (2023), knowledge transfer requires not only access to information but also sufficient cognitive processing time. In nano-learning environments, where content is brief and often consumed

rapidly, extended watch time becomes essential for deeper understanding and retention.

Moreover, the mediation analysis further confirms that engagement and watch time jointly facilitate knowledge transfer. The indirect effect of engagement between motivation and learning effectiveness (0.1175), and the stronger sequential mediation through watch time (0.165), indicate that behavioral persistence plays a crucial role in transforming user intention into actual learning outcomes.

These findings have several theoretical and practical implications. Theoretically, the study contributes to the literature on digital learning by integrating psychological (motivation, satisfaction) and behavioral (engagement, watch time) variables into a unified model explaining knowledge transfer in nano-learning. Practically, the results suggest that platform designers and educators should prioritize strategies that increase meaningful watch time—such as optimizing video structure, enhancing content relevance, and encouraging continuous viewing—rather than focusing solely on attracting initial engagement.

However, this study has some limitations. The reliance on self-reported data may introduce response bias, and the cross-sectional design limits the ability to infer causal relationships. Future research should incorporate objective behavioral tracking data and longitudinal approaches to better capture the dynamics of nano-learning over time.

Recommendation

Based on the findings, future research should incorporate behavioral tracking data to validate self-reported engagement and watch time. Additionally, longitudinal designs could provide deeper insight into how sustained nano-learning behaviors influence long-term knowledge retention. Platform designers

are also encouraged to optimize content structure to increase meaningful watch time rather than superficial interaction.

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