



DESIGNING GAMIFIED LEARNING ENVIRONMENTS FOR CREATIVITY AND PROFESSIONAL DEVELOPMENT: A TWO-ROUND DELPHI APPRAISAL OF AN ACMEOLOGICAL FRAMEWORK

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Abstract. Gamification and acmeological pedagogy have developed as parallel and largely disconnected traditions in higher education: gamified environments are designed around engagement and reward, whereas acmeology theorises the trajectory toward professional mastery but offers few operational design mechanics. This study constructs and appraises the Acmeological Gamification Design Framework (AGDF), which specifies how gamified environments can support creativity and professional development jointly. The framework was derived from a systematic conceptual synthesis of 50 sources (Scopus and Web of Science, 2015–2024) analysed through theory-driven coding, and was then submitted to a two-round Delphi panel of nine experts in acmeological pedagogy, gamification and educational technology, and higher education curriculum development. The AGDF comprises five interrelated principles - Developmental Trajectory Alignment, Intrinsic Motivation Primacy, Creative Challenge Calibration, Reflective Mastery Loops and Collaborative Professional Emergence - each mapped to compatible mechanics and to a function in the learning environment. All five satisfied the predefined consensus criterion, and ratings rose while dispersion fell after refinement (Round 2 $M = 4.30$ – 4.70 ; $SD = 0.35$ – 0.51 ; response rate 9/9 in both rounds). The study contributes an expert-appraised design framework, five propositions and a validation roadmap for subsequent research on learner-level effects.

Keywords: gamification; digital learning environments; creativity; higher education; professional development; Delphi study

Аннотация: Геймификация и акмеологическая педагогика развивались в высшем образовании как параллельные и почти не связанные между собой традиции: геймифицированные среды проектируются вокруг вовлечённости и вознаграждения, тогда как акмеология описывает траекторию движения к профессиональному мастерству, но предлагает мало операциональных проектных механик. В исследовании разработана и подвергнута экспертной оценке акмеологическая модель проектирования геймификации (Acmeological Gamification Design Framework, AGDF), определяющая, каким образом геймифицированные среды могут одновременно

поддерживать креативность и профессиональное развитие. Модель построена на основе систематического концептуального синтеза 50 источников (Scopus и Web of Science, 2015–2024), проанализированных методом теоретически обоснованного кодирования, и затем оценена в двухраундовом Дельфи-опросе девяти экспертов в области акмеологической педагогики, геймификации и образовательных технологий, а также разработки учебных программ высшего образования. AGDF включает пять взаимосвязанных принципов: согласование с траекторией развития, приоритет внутренней мотивации, калибровку креативного вызова, рефлексивные циклы мастерства и эмерджентность профессионального сотрудничества, - каждый из которых соотнесён с совместимыми механиками и функцией в образовательной среде. Все пять принципов удовлетворили заранее заданному критерию консенсуса; после доработки средние оценки выросли, а разброс снизился (второй раунд: $M = 4,30-4,70$; $SD = 0,35-0,51$; отклик 9/9 в обоих раундах). Работа предлагает экспертно оценённую модель проектирования, пять исследовательских положений и дорожную карту эмпирической валидации.

Ключевые слова: геймификация; цифровые образовательные среды; креативность; высшее образование; профессиональное развитие; метод Дельфи

Annotatsiya. Gamifikatsiya va akmeologik pedagogika oliy ta’limda o‘zaro bog‘lanmagan, parallel an’analarda sifatida rivojlanib keldi: gamifikatsiyalashgan muhitlar, odatda, jalb etilganlik va rag‘bat atrofida loyihalanadi, akmeologik pedagogika esa kasbiy mahoratga eltuvchi traektoriyani nazariy jihatdan asoslaydi, biroq operatsional loyihalash mexanikalarini kam taklif etadi. Mazkur tadqiqotda gamifikatsiyalashgan ta’lim muhitlari ijodkorlik va kasbiy rivojlanishni birgalikda qo‘llab-quvvatlashi uchun qanday tuzilishi kerakligini belgilovchi Akmeologik gamifikatsiya loyihalash modeli (Acmeological Gamification Design Framework, AGDF) ishlab chiqildi va ekspert bahosidan o‘tkazildi. Model 50 ta manbaning (Scopus va Web of Science, 2015–2024) tizimli kontseptual sintezi asosida, nazariyaga tayangan kodlash orqali tuzildi hamda akmeologik pedagogika, gamifikatsiya va ta’lim texnologiyalari, oliy ta’lim o‘quv dasturlarini ishlab chiqish sohalaridan to‘qqiz nafar ekspert ishtirokidagi ikki bosqichli Delfi so‘rovida baholandi. AGDF beshta o‘zaro bog‘liq tamoyildan iborat: rivojlanish traektoriyasiga muvofiqlik, ichki motivatsiya ustuvorligi, ijodiy qiyinlikni kalibrlash, refleksiv mahorat sikllari va kasbiy hamkorlikning emergentligi; har biri mos mexanikalarga hamda ta’lim muhitidagi aniq funksiyaga bog‘langan. Beshala tamoyil oldindan belgilangan konsensus mezoniga javob berdi; takomillashtirishdan so‘ng o‘rtacha baholar oshdi, tarqoqlik esa kamaydi (2-bosqich: $M = 4,30-4,70$; $SD = 0,35-0,51$; ikkala bosqichda javob darajasi 9/9). Tadqiqot ekspert bahosidan o‘tgan loyihalash modelini, beshta ilmiy farazni va empirik validatsiya yo‘l xaritasini taklif etadi.

Kalit so‘zlar: gamifikatsiya; raqamli ta’lim muhitlari; ijodkorlik; oliy ta’lim; kasbiy rivojlanish; Delfi metodi

1. Introduction. The reorientation of higher education toward graduate outcomes such as creativity, self-regulation and professional maturity has intensified the search for learning

designs able to support these complex objectives. Gamification - the use of goals, feedback, narratives, quests and progression systems derived from game design (Deterding et al., 2011) - has become one of the most widely adopted strategies for restructuring the learner experience in technology-supported environments (Plass et al., 2015; Koivisto & Hamari, 2019).

Reviews and meta-analyses indicate that gamification can enhance motivation, engagement and several learning outcomes when designed with sensitivity to context and learner needs (Sailer & Homner, 2020; Zainuddin et al., 2020), with the strongest results reported for challenge-based designs rather than isolated reward delivery (Legaki et al., 2020). A substantial critical literature, however, documents recurring limitations: many implementations overlay points, badges and leaderboards on an unchanged instructional design (Hamari et al., 2014; Dichev & Dicheva, 2017); extrinsic reward structures can crowd out intrinsic motivation where creative engagement is central (Mekler et al., 2017); and leaderboards can generate competitive anxiety among learners who fall behind early (Manzano-León et al., 2021). Gamification consequently operates as an engagement layer rather than as a developmental architecture aligned with long-term professional growth.

Acmeology, the interdisciplinary science of peak achievement and professional maturation, addresses precisely this developmental dimension. The acme denotes the highest realised level of professional mastery and creative self-realisation - a dynamic horizon that learners progressively approach rather than a static endpoint (Bodalev, 1998; Derkach, 2004). Acmeological pedagogy frames professional development as an actively constructed individual trajectory requiring metacognitive engagement, environmental support and personalised challenge (Kuzmina, 1990; Markova, 1996), and applied studies in teacher education have specified acmeological technologies for developing cognitive competence (Maxmudova, 2023, 2025). The tradition nevertheless remains under-operationalised, staying largely at the level of models and competence taxonomies.

Creativity research supplies the second theoretical resource. Componential theory holds that creative performance depends on domain-relevant skills, creativity-relevant processes and intrinsic task motivation, and that reward-saturated environments suppress the motivational substrate most generative of creative output (Amabile, 1996). Flow theory adds that calibrated challenge produces autotelic engagement conducive to creative work (Csikszentmihalyi, 1997), while the Four-C model recasts creativity as a developmental progression that maps onto acmeological maturity stages (Kaufman & Beghetto, 2009).

These literatures remain weakly integrated. Gamification frameworks rarely incorporate acmeological constructs such as developmental trajectory or trajectory-aligned challenge progression; conversely, acmeological pedagogy seldom specifies how its principles can be enacted through intrinsically motivating mechanics implementable in digital environments, and self-determination theory is commonly invoked as a post hoc interpretive lens rather than as a generative design framework (Ryan & Deci, 2017; Sailer et al., 2017). Within the reviewed corpus, no study synthesised acmeological principles with gamification mechanics into a unified, expert-appraised design framework.

The present study addresses this gap through four research questions. RQ1: Which acmeological principles are theoretically necessary for designing gamified environments aimed at creativity and professional development? RQ2: Which mechanics operationalise these principles without undermining intrinsic motivation? RQ3: How do experts evaluate the framework’s theoretical coherence, practical applicability and acmeological alignment? RQ4: What empirical validation pathways are appropriate for future testing?

2. Method

2.1. Research design and corpus construction

The study combines systematic conceptual synthesis and framework construction (Jaakkola, 2020) with a two-round Delphi expert appraisal. The only primary data collected were expert ratings and qualitative comments; no learner-level data were collected at any stage.

A systematic search of Scopus and Web of Science (Core Collection) followed PRISMA 2020 guidance (Page et al., 2021), using the query (acmeolog* OR “professional mastery” OR “professional self-development”) AND (gamif* OR “game-based learning”) AND (creativity OR “creative thinking” OR “professional competence”) AND (“higher education” OR university). The corpus had two layers: peer-reviewed literature published in 2015–2024 in English or Russian, and seminal theoretical works identified through backward citation searching, exempt from the date restriction and used solely for theoretical anchoring. Identification yielded 735 records (412 Scopus, 287 Web of Science, 36 citation searching). After removal of 148 duplicates, 587 records were screened by title and abstract and 471 excluded; 116 full texts were assessed and 66 excluded, principally for insufficient pedagogical focus (n = 19), absence of a higher education focus (n = 17), non-peer-reviewed status (n = 12), theoretical duplication (n = 11) and unavailable full text (n = 7). Fifty sources were retained. Screening and coding were carried out by the sole author; the implications are considered in Section 4.1.

The corpus was analysed through theory-driven coding using deductive categories: developmental trajectory; intrinsic motivation; creative challenge; reflective mastery; collaborative professional learning; and professional self-actualisation. Construct mapping then aligned acmeological constructs with compatible mechanics drawn from established taxonomies (Toda et al., 2019), and each principle was formulated in declarative terms specifying its acmeological function, theoretical anchoring, recommended mechanics, expected outcome and the design risk it averts.

2.2. Delphi expert appraisal

Nine experts were recruited by purposive sampling against five criteria: a doctoral qualification in a relevant discipline; at least seven years of post-doctoral experience; a documented record of publications or curriculum-development work in the domain; active engagement in higher education; and capacity to work with English-language materials. No panellist had been involved in constructing the framework. The panel was distributed equally across acmeological pedagogy and educational psychology (n = 3), gamification and educational technology (n = 3), and curriculum development (n = 3).

In Round 1, panellists received a structured presentation of the framework architecture, the five principles, the mechanics mapping and the theoretical rationale, and evaluated each principle on five five-point Likert criteria: theoretical coherence; internal consistency; practical applicability; acmeological alignment; and clarity of operationalisation. Following established Delphi guidance (Hasson et al., 2000; Hsu & Sandford, 2007), anonymity was preserved and panellists received aggregated, de-identified feedback only. Consensus was defined a priori as a principle-level mean of at least 4.00 with a standard deviation of at most 0.70, and only principle-level aggregate statistics were retained. Round 1 comments informed refinement; Round 2 established whether the refinements were endorsed and whether agreement was stable under re-evaluation. The response rate was 100 per cent in both rounds (9/9).

3. Results

3.1. Architecture and design principles

The AGDF integrates acmeological pedagogy with gamification mechanics in the service of creativity and professional development. Its organising purpose is to reconceptualise gamification from an engagement-oriented motivational layer into a developmental architecture that scaffolds students' movement toward professional mastery and creative self-realisation. Its principles form an integrated system in which each gains its full force only in alignment with the others.

Developmental Trajectory Alignment (DTA) holds that mechanics should follow each student's individual trajectory toward professional mastery rather than impose a uniform progression; it is realised through branching activity sequences and rule-based adaptive release, in which the next task set is conditioned on demonstrated mastery rather than elapsed time.

Intrinsic Motivation Primacy (IMP) establishes intrinsic motivation as a structural design constraint: mechanics that risk undermining autonomy, competence or relatedness - controlling reward schedules, surveillance-style assessment, forced public comparison - are excluded by design, and the principle is expressed in learner-controlled feedback settings, private progress displays and opt-in comparative elements (Ryan & Deci, 2017).

Creative Challenge Calibration (CCC) requires the challenge architecture to support flow: tasks should be neither trivially easy nor overwhelming, and open-ended enough to invite divergent responses. It is implemented through adaptive difficulty rules and task pools tagged by demanded skill level, supporting qualitative creative transitions rather than routine completions.

Reflective Mastery Loops (RML) embeds reflection and metacognitive engagement at the architectural level: e-portfolios and reflection checkpoints gate progression, so advancement requires a documented act of self-assessment supported by formative feedback (Hattie & Timperley, 2007).

Collaborative Professional Emergence (CPE) situates gamified learning within authentic, profession-oriented social structures (Lave & Wenger, 1991), persistent team spaces with assigned professional roles and shared deliverables, and scenario simulations in which learners occupy defined positions in a modelled professional setting. Table 1 maps the

principles to acmeological functions, theoretical anchors, mechanics, expected outcomes and design risks.

Table 1.

Principles, acmeological functions, mechanics, expected outcomes and design risks

Principle	Acmeological function	Theory base	Mechanics	Expected outcome	Risk to avoid
DTA	Trajectory-aligned development	Acmeology; stage models	Adaptive quests; branching paths; learner-selected routes	Trajectory-aligned mastery progression	Rigid uniform progression
IMP	Motivational regulation	Self-determination theory; creativity theory	Autonomy-supportive choices; mastery badges; non-controlling feedback	Sustained intrinsic engagement	Reward dependency; controlling structures
CCC	Creative challenge engagement	Flow theory; Four-C model	Adaptive missions; open-ended quests; divergent tasks	Flow and qualitative creative growth	Anxiety, boredom or routine repetition
RML	Reflective self-regulation	Self-regulated learning; reflective practice	Reflective journals; portfolios; peer-review missions	Metacognitive professional development	Surface compliance with reflection
CPE	Professional identity formation	Situated learning; communities of practice	Guilds; role-play; collaborative quests	Emergent professional identity	Toxic competition; isolation

3.2. Delphi appraisal results

In Round 1 all five principles already satisfied the predefined criterion, with means between 4.00 and 4.50 and standard deviations between 0.48 and 0.70; the lowest ratings were recorded for Collaborative Professional Emergence and Creative Challenge Calibration. Qualitative comments identified opportunities for refinement, particularly the operationalisation of challenge–skill calibration and the framing of collaborative roles. After refinement, Round 2 means rose across all five principles to between 4.30 and 4.70 while standard deviations fell to between 0.35 and 0.51 (Table 2).

Table 2.

Delphi appraisal results across two rounds (n = 9). Consensus criterion: mean $\geq$ 4.00 and SD $\leq$ 0.70

Principle	R1 M	R1 SD	Main expert feedback	R2 M	R2 SD	Criterion met
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Principle	R1 M	R1 SD	Main expert feedback	R2 M	R2 SD	Criterion met
DTA	4.30	0.62	Strengthen articulation of stage-based progression and personalisation criteria	4.60	0.41	Both rounds
IMP	4.20	0.66	Clarify boundary between motivational support and behavioural control	4.50	0.44	Both rounds
CCC	4.10	0.69	Sharpen operationalisation of challenge–skill calibration in concrete mechanics	4.40	0.49	Both rounds
RML	4.50	0.48	Make reflection mechanics more visible across the progression system	4.70	0.35	Both rounds
CPE	4.00	0.70	Provide stronger framing for collaborative roles and identity formation	4.30	0.51	Both rounds

These results should be read strictly as an expert appraisal of the framework’s theoretical coherence and practical applicability. They are not evidence of learner-level effects; their function is to establish the framework’s credibility as a basis for empirical investigation.

3.3. Propositions for empirical testing

Five propositions follow from the framework, formulated as claims to be examined rather than as supported hypotheses. P1: AGDF-based gamification enhances creative thinking by aligning mechanics with individual developmental trajectories. P2: intrinsic motivation mediates the relationship between AGDF-based environments and creative performance. P3: flow experience mediates the relationship between creative challenge calibration and professional competence development. P4: reflective mastery loops strengthen self-regulated professional development. P5: collaborative professional emergence supports professional identity formation through peer-based and situated mechanics.

The validation roadmap suggests a quasi-experimental pre-test/post-test design with standardised creativity measures for P1 ($n \geq 120$ per condition); mediation analysis for P2 and PLS-SEM modelling for P3 ($n \geq 200$); a longitudinal mixed-methods design for P4 ($n \geq 60$); and social network or community-of-practice analysis for P5 (cohorts of 80–150). Multi-institutional and cross-cultural designs are encouraged, since acmeological theory has developed primarily within post-Soviet traditions and gamification effects are culturally sensitive.

4. Discussion

The contribution of this study is a design framework bridging acmeological pedagogy and gamification, together with a structured expert appraisal of its coherence and applicability. By embedding mechanics within an acmeological developmental architecture,

the framework reframes gamification from a motivational layer into a developmental system. This addresses a recurrent critique - that many implementations remain reward-driven and engagement-centred (Dichev & Dicheva, 2017) - while supplying acmeological pedagogy with the operational mechanics it has so far lacked.

Each principle contributes a distinct element of this integration. DTA situates quests and challenge sequences within stage-based models of professional maturation, addressing the developmental shallowness of engagement-focused implementations. IMP positions autonomy, competence and relatedness as structural constraints rather than as a post hoc lens, consistent with evidence that controlling reward structures constrain the intrinsic motivation on which creative performance depends (Amabile, 1996; Mekler et al., 2017). CCC treats challenge calibration as an imperative aimed at qualitative creative growth (Legaki et al., 2020); RML foregrounds metacognitive self-regulation as an architectural feature; and CPE resolves the individualistic bias of much creativity-focused gamification work. Notably, CCC and CPE, whose operationalisation was least specified in Round 1, received the lowest initial ratings and improved once mechanics and boundary conditions were made explicit, suggesting that the panel differentiated theoretical plausibility from clarity of translation into design.

For instructors and instructional designers, the framework serves both as a planning heuristic for the architecture of gamified environments and as a diagnostic instrument: a course that fails to address one or more principles can be described in those terms and redesigned accordingly. No claim is made that the framework has improved students' creativity; it specifies a theoretically grounded pathway for designing environments that may do so.

4.1. Limitations

The framework has not been tested with learners and offers propositions rather than demonstrated effects. The evidence rests on principle-level aggregate statistics, so no index of inter-round agreement could be computed, and the panel of nine supports a focused appraisal but limits generalisability. Screening and coding were performed by a single researcher, without a second reviewer, which introduces a risk of selection and interpretation bias. Acmeological theory is rooted predominantly in Eastern European and post-Soviet traditions, so cross-cultural adaptation will be required, and the mechanics, specified at a general level, will need discipline-specific adaptation.

5. Conclusion

This study developed the Acmeological Gamification Design Framework and submitted it to a two-round Delphi appraisal by nine experts. Its five principles articulate the developmental, motivational, creative, metacognitive and social-professional architectures of a gamified learning environment; all five satisfied the predefined consensus criterion, while ratings increased and dispersion decreased after refinement. The framework is therefore offered as an expert-appraised design model rather than as an empirically tested intervention. By reframing gamification from an engagement tool into a developmental architecture, and by giving acmeological pedagogy concrete operational mechanics, it responds to a long-

standing integration gap in higher education research. Quasi-experimental, longitudinal and SEM-based studies are now required to test the propositions against learner-level evidence.

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