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MOTIVATIONAL AND PSYCHODIAGNOSTIC FOUNDATIONS OF DIGITAL PHYSICAL EDUCATION IN HIGHER EDUCATION

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Abstract

The rapid digitalization of higher education has created a paradox for physical education: digital tools can either strengthen students' motivation for movement or deepen passivity if they are reduced to screen-based control, numerical comparison and formal reporting. This article examines the motivational and psychodiagnostic foundations of digital physical education in higher education, with particular attention to students of physical culture and to the broader psychological challenges of learning in a digital world. The purpose of the study is to develop a theoretically grounded and practically applicable model for integrating digital technologies into physical education without weakening the human, bodily and value-oriented essence of the discipline. The research problem is approached through the logic of self-determination theory, quality physical education, health-oriented pedagogy and digital psychodiagnostics. The methodological basis consists of analytical literature review, comparative pedagogical analysis, conceptual modeling, and diagnostic synthesis of motivational, emotional, behavioral and reflective indicators. The article argues that digital physical education should not be interpreted as a simple transfer of exercises into an electronic platform; rather, it should be organized as a pedagogical environment where wearable monitoring, video feedback, mobile applications, online reflective journals and psychodiagnostic instruments support autonomy, competence, relatedness, self-regulation and responsible attitudes toward health. The main result is a four-component model that includes digital motor practice, motivational support, psychodiagnostic monitoring and reflective correction. The model clarifies diagnostic criteria, teacher actions, student feedback mechanisms and ethical safeguards. The discussion shows that digital tools become pedagogically useful only when they are subordinated to educational meaning, privacy, inclusion and the formation of stable physical activity habits. The article concludes that higher education institutions

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should treat digital physical education as a complex psychological-pedagogical system rather than as a technological supplement to traditional classes.

Keywords: Digital physical education, physical culture, motivation, psychodiagnostics, self-determination theory, higher education, wearable technologies, student well-being, reflective correction, physical activity.

Introduction

In contemporary higher education, physical education is no longer limited to the organization of training sessions, the correction of motor technique and the assessment of students' physical preparedness; it increasingly performs a wider psychological, social and cultural function because the student enters the educational process with a changed lifestyle, a changed communicative environment and a changed relationship with the body. Digitalization has intensified this change. On the one hand, digital platforms, smartphones, wearable devices, online learning environments, video analysis systems and artificial intelligence tools have given teachers new opportunities to individualize training loads, observe movement quality, provide immediate feedback and involve students who were previously passive or insecure in practical activity. On the other hand, the same digital environment has produced sedentary behavior, fragmented attention, dependence on external evaluation, social comparison, technostress and a reduction of spontaneous movement in daily life. For this reason, the scientific problem of digital physical education should be considered not only as a technological problem, but also as a psychological and pedagogical problem. The central question is not whether technology should be used in physical education, because it is already present in students' lives; the real question is how it should be used so that it strengthens internal motivation, protects mental well-being and supports the development of conscious physical culture. The World Health Organization emphasizes that physical activity recommendations are evidence-based public health requirements for different age groups and that sedentary behavior is itself a risk factor, while UNESCO's approach to quality physical education links bodily development with social, emotional and civic competencies. These positions are especially important for universities, because students are at a stage where professional identity, health habits, communication style and self-regulation strategies are still actively developing. In this context, physical education

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can become a stabilizing discipline: it gives the student a structured experience of effort, discipline, bodily awareness, teamwork, emotional control and personal progress. However, if digital tools are introduced mechanically, they may turn this experience into a dry register of points, steps, heart-rate zones and rankings. Such a mistake would be methodologically primitive and psychologically unsafe. Numbers are useful, but they do not teach responsibility by themselves; feedback is valuable, but only if it is understandable, ethically organized and connected with a student's own goals. Therefore, digital physical education must be designed on a motivational basis. Self-determination theory offers one of the most productive frameworks for this task because it explains how autonomy, competence and relatedness support more stable and self-regulated behavior. In physical education, autonomy does not mean the absence of teacher guidance; it means that students understand the meaning of tasks, can choose appropriate forms of participation and feel that movement is connected with personal value rather than external pressure. Competence does not mean only high sport performance; it means that the student experiences visible progress, receives constructive feedback and learns to interpret bodily signals. Relatedness does not mean only group presence; it means that the learning environment contains trust, cooperation and psychological safety. Digital tools can support these three needs if they are used intelligently: a mobile application can help students set personal goals; video analysis can show progress in movement coordination; online journals can support reflection; group dashboards can organize teamwork without humiliating weaker students; wearable monitoring can prevent excessive loads and encourage health-oriented self-control. Yet the same tools can undermine motivation when they impose rigid control, create public comparison, intensify anxiety or reduce the teacher's living pedagogical role. This ambivalence makes psychodiagnostics essential. Psychodiagnostics in digital physical education should not be reduced to testing for the sake of testing; it should be a continuous, ethical and pedagogically interpreted process that reveals how the student experiences physical activity, what motivates or blocks participation, what emotional states appear during training, how the student evaluates progress, and whether digital feedback increases confidence or creates pressure. The relevance of the present article is therefore determined by three intersecting circumstances: first, the growth of digital technologies in education and everyday health behavior; second, the need to preserve the humanistic and health-oriented mission of physical culture; third, the insufficient

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methodological clarification of how motivation and psychodiagnostics should be combined in digitally enriched physical education. The object of the study is the educational process of physical education in higher education. The subject of the study is the motivational and psychodiagnostic mechanisms through which digital technologies can support students' physical activity, self-regulation and psychological well-being. The aim of the article is to substantiate a model of digital physical education that integrates technological feedback with motivational support and psychodiagnostic monitoring. The tasks are to analyze theoretical foundations of motivation in physical activity, clarify the pedagogical role of digital instruments, identify diagnostic indicators relevant for higher education, propose a structured model for implementation and formulate recommendations for teachers of physical culture. The scientific novelty of the article lies in the interpretation of digital physical education as a motivational-diagnostic system rather than as a collection of electronic resources. Its practical significance is that the proposed model can be used in university physical education classes, independent student activity, blended learning modules and health-oriented extracurricular programs. The hypothesis is that digital technologies improve the quality of physical education only when they are embedded in a pedagogical design that supports autonomy, competence, relatedness, reflection, ethical data use and differentiated feedback; without these conditions, the same technologies may remain superficial or even counterproductive. This position gives the article its main argument: the future of physical education in the digital world will depend less on the number of devices and more on the psychological literacy of teachers who use them.

METHODS

The article was prepared as a theoretical-analytical and methodological study, because the central aim was not to report a narrow empirical experiment with one local sample, but to construct a scientifically grounded model that can be adapted to different higher education contexts. The methodological strategy combined four mutually connected procedures. First, an analytical review of international scientific and policy literature was conducted in order to identify the dominant approaches to physical activity, quality physical education, student motivation, digital technologies and psychodiagnostic monitoring. Special attention was given to sources that connect physical education with psychological outcomes, including self-determination theory,

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systematic reviews on motivation in physical activity, research on technology use in physical education, and public health guidelines on physical activity and sedentary behavior. Second, comparative pedagogical analysis was used to distinguish traditional, blended and digitally enriched forms of physical education. Traditional physical education was understood as direct teacher-led practical instruction with limited technological mediation; blended physical education was understood as the combination of face-to-face movement practice with digital assignments, online reflection or remote monitoring; digitally enriched physical education was understood as a system where digital feedback is systematically linked with pedagogical goals, psychological support and assessment criteria. This distinction is necessary because any random use of a smartphone or application should not automatically be called digital pedagogy. Third, conceptual modeling was applied. In this procedure, the main components of the proposed system were identified, their internal functions were described, and the relationship between motivation, psychodiagnostics and pedagogical correction was structured. The model was built on the assumption that physical education contains at least four inseparable layers: motor activity, motivational experience, emotional state and reflective interpretation. A student's real learning outcome is formed at the intersection of these layers. For example, two students may perform the same endurance exercise, but the pedagogical meaning of the task will be different if one student experiences it as personal progress and another experiences it as public failure. Therefore, the model treats movement not only as a biomechanical act but also as a psychological event. Fourth, diagnostic synthesis was used to select indicators that are sufficiently concrete for pedagogical use and sufficiently broad for scientific interpretation. The selected indicators were grouped into motivational, behavioral, emotional, cognitive-reflective and digital-ethical domains. Motivational indicators include autonomous reasons for participation, interest in physical self-development, perceived value of exercise and willingness to continue activity outside the lesson. Behavioral indicators include attendance, regularity of independent exercise, engagement during tasks, recovery discipline and safe execution of movements. Emotional indicators include confidence, anxiety, satisfaction after effort, fear of failure, fatigue perception and comfort in group interaction. Cognitive-reflective indicators include the student's ability to understand training goals, interpret feedback, set realistic objectives and connect physical activity with health. Digital-ethical indicators include responsible use of applications,

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protection of personal data, avoidance of unhealthy comparison, and the capacity to treat digital numbers as information rather than as a judgment of personal worth. The article does not claim that these indicators replace standardized psychological tests; rather, it proposes that a teacher of physical culture should combine standardized instruments, pedagogical observation, digital records and student reflection. In practical application, the diagnostic toolkit may include short motivation questionnaires, self-efficacy scales, wellness check-ins, physical activity logs, heart-rate or step-count data where available, video-based technical analysis, and reflective diaries. The methodology also follows an ethical principle: the student must know what data are collected, why they are collected, how they will be interpreted and who will have access to them. Public ranking should be avoided unless it has a clear educational purpose and does not humiliate students with lower physical preparedness. The diagnostic process should be cyclical. At the initial stage, baseline motivational and behavioral data are collected to identify student profiles. At the formative stage, digital feedback and teacher observation are used to monitor progress. At the reflective stage, students compare their results not with the strongest member of the group, but primarily with their own previous condition, goals and health needs. At the corrective stage, training loads, digital assignments and psychological support strategies are adjusted. This methodological sequence makes it possible to transform digital tools from instruments of external surveillance into instruments of self-knowledge. The validity of the proposed model is supported through theoretical coherence, correspondence with established motivational theory, compatibility with quality physical education principles and practical applicability to university teaching. The limitation of this methodological approach is that it requires subsequent empirical verification in specific institutional conditions. However, for a conference article aimed at identifying current problems and proposing innovative solutions, such modeling has clear scientific value, because it defines the conceptual architecture that later experimental studies can test more precisely.

RESULTS

The main result of the study is the development of a four-component motivational and psychodiagnostic model of digital physical education for higher education. The first component is digital motor practice. Its task is to make movement practice more visible, individualized and pedagogically controlled without replacing living bodily

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activity with passive screen consumption. This component includes video demonstration of exercises, slow-motion analysis of technique, wearable monitoring of physical load, mobile applications for independent activity, digital portfolios of motor progress and online modules that explain health-related principles of training. The decisive point is that technology is used around movement, not instead of movement. A student may record a jump, a coordination drill, a flexibility exercise or a running session, but the educational value appears only when the record helps the student understand body position, rhythm, breathing, effort distribution or safe technique. The second component is motivational support. It is built on autonomy, competence and relatedness. In practical terms, autonomy is supported when students receive meaningful explanations of tasks, have limited but real choices in exercise type or intensity, and formulate personal goals that correspond to their health and preparedness. Competence is supported when digital feedback shows progress in a clear and non-punitive form, when errors are interpreted as correctable elements of technique, and when the teacher explains the next step rather than merely giving a mark. Relatedness is supported when digital group tasks encourage cooperation, peer encouragement and shared responsibility instead of primitive competition. For example, a group challenge may be organized around collective improvement, regular participation or the completion of health-oriented tasks, rather than around a public ranking of the fastest or strongest students. The third component is psychodiagnostic monitoring. It includes baseline, formative and final diagnostic procedures that reveal the student's motivational profile and psychological response to digital physical education. Baseline diagnosis identifies whether the student is primarily motivated by health, appearance, achievement, social contact, external requirement or avoidance of negative evaluation. It also reveals barriers such as low self-confidence, fear of public performance, previous negative experiences in sport, digital fatigue, excessive screen dependence or lack of knowledge about safe exercise. Formative diagnosis observes changes during the course: whether the student becomes more active, whether self-efficacy grows, whether anxiety decreases, whether digital feedback helps or overloads, and whether independent exercise becomes more regular. Final diagnosis evaluates not only physical indicators but also the stability of motivation, the quality of reflection and the student's readiness to continue activity after the course. The fourth component is reflective correction. This component transforms diagnostic information into pedagogical decisions. If data show low autonomy, the teacher

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increases choice and explanation; if data show low competence, the teacher simplifies tasks and provides more immediate corrective feedback; if data show weak relatedness, the teacher reorganizes group interaction; if data show digital anxiety, the teacher reduces public comparison and explains the meaning of indicators more carefully; if data show overtraining or excessive self-pressure, the teacher emphasizes recovery and health rather than achievement. The model therefore creates a feedback loop: activity produces data, data produce reflection, reflection produces correction, and correction produces more meaningful activity. On the basis of this model, five diagnostic criteria were formulated. The first criterion is motivational internalization, which is expressed in the student's transition from external obligation to personally accepted reasons for physical activity. Its indicators are voluntary participation, formulation of personal goals, interest in improvement, and the ability to explain the value of exercise for health and professional life. The second criterion is perceived motor competence, which is expressed in the student's confidence that movement skills can be improved through practice. Its indicators are reduction of fear of failure, readiness to repeat tasks, constructive response to feedback and visible improvement in selected motor actions. The third criterion is psycho-emotional safety, which is expressed in the student's stable emotional participation without humiliation, excessive anxiety or avoidance. Its indicators are comfort in group tasks, moderate challenge, positive affect after effort and trust in teacher feedback. The fourth criterion is reflective self-regulation, which is expressed in the student's ability to plan, monitor and evaluate physical activity. Its indicators are keeping an activity diary, interpreting heart-rate or step-count data, understanding fatigue and recovery, and adjusting goals realistically. The fifth criterion is digital responsibility, which is expressed in the student's ethical and balanced use of technological tools. Its indicators are consent to data use, privacy awareness, rejection of harmful comparison, understanding of measurement limitations and ability to disconnect from technology when it becomes distracting. These criteria can be used as a rubric for university physical education. The model also allows differentiation of students into several pedagogical profiles. The first profile may be called the externally compliant student: this student attends classes because they are required, completes tasks formally and needs autonomy-supportive explanation. The second profile is the anxious low-competence student: this student may avoid active participation not because of laziness, but because of fear of failure, body shame or previous negative experience. This profile requires private

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feedback, gradual progression and emotionally safe digital monitoring. The third profile is the achievement-oriented student: this student is active and competitive but may need support in recovery, ethical comparison and balanced motivation. The fourth profile is the digitally engaged but physically passive student: this student likes applications and online tools but has weak movement habits; the teacher should convert digital interest into bodily practice. The fifth profile is the self-regulated student: this student understands goals, monitors progress and can use digital tools responsibly; such students may be given more independent projects and peer-support roles. The practical algorithm derived from the model includes eight steps: explain the educational meaning of digital tools; collect minimal baseline data with informed consent; formulate individual and group goals; conduct movement tasks with video or wearable feedback where appropriate; organize short reflective writing after key lessons; review motivational and emotional indicators; correct tasks according to student profiles; and evaluate final progress through a combination of physical, motivational and reflective evidence. This algorithm is intentionally moderate. It does not require expensive infrastructure as a precondition. Even a smartphone camera, a shared online form, a simple step log and a teacher's structured observation can support the model if they are used methodologically. At the same time, more advanced tools such as heart-rate monitors, learning management systems, AI-based motion analysis or adaptive training applications can strengthen the process when available. The expected pedagogical outcomes of the model are increased regularity of physical activity, stronger autonomous motivation, improved self-efficacy, more accurate understanding of personal physical condition, safer exercise behavior, reduced avoidance among less prepared students, and improved teacher capacity to individualize instruction. The model also produces institutional outcomes: it gives physical education departments a clearer basis for monitoring quality, integrating digital resources, training teachers and demonstrating the psychological value of physical culture in the digital university. The most important result, however, is conceptual: digital physical education becomes meaningful only when the teacher sees technology not as a fashionable accessory, but as a controlled pedagogical instrument for developing the student's body, motivation and self-knowledge.

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DISCUSSION

The proposed model confirms that the digital transformation of physical education cannot be judged by the mere presence of devices, platforms or applications; its quality depends on the psychological logic of their use. This point is important because educational systems often confuse digitalization with modernization. A lesson does not become modern because a teacher uses a QR code or asks students to upload a report. It becomes modern when the learning process becomes more conscious, more individualized, more inclusive and more effective. In physical education, this distinction is even sharper than in many theoretical subjects, because the central educational material is the student's own body in action. If technology pulls attention away from bodily experience, breathing, coordination, effort and interpersonal contact, it weakens the discipline. If technology helps the student notice these processes more accurately, it strengthens the discipline. The literature on motivation in physical activity consistently shows that external pressure is a weak foundation for long-term behavior, while autonomous motivation is associated with more adaptive outcomes. This does not mean that assessment, norms and teacher requirements should disappear. Physical education is still an organized academic discipline, not a recreational suggestion. However, requirements must be pedagogically justified and psychologically interpreted. Students should understand why endurance matters, why flexibility prevents injury, why coordination supports professional and everyday functioning, and why regular movement is connected with emotional stability. Digital technologies can make these explanations more concrete. A wearable device can show that sleep, stress and recovery affect performance; video analysis can show that a technical error is not a personal defect but a correctable movement pattern; a reflective diary can show that mood improves after moderate physical activity; an online portfolio can show progress across weeks rather than only one final mark. Such tools make the invisible visible. Yet visibility is not automatically educational. When every movement becomes data, there is a danger that students begin to perceive the body only through numerical indicators. This danger is especially real among students who are sensitive to comparison, appearance anxiety or achievement pressure. Therefore, the teacher must develop a data culture. Data culture in physical education means that numbers are treated as signals for understanding, not as labels for judging. A low step count may indicate illness, fatigue, depression, lack of time, poor motivation or simply a measurement error; it

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should not be interpreted mechanically. A high training load may indicate discipline, but it may also indicate risky overcompensation. Psychodiagnostics helps the teacher avoid such superficial conclusions. It introduces context into digital evidence. For instance, if a student shows low participation, the teacher should ask whether the barrier is motivational, emotional, social, technical or health-related. If digital monitoring increases anxiety, the teacher should reduce exposure and use more private forms of feedback. If group competition motivates some students but humiliates others, the teacher should design parallel tasks where success can be defined through individual progress, cooperation and effort consistency. This is a strong argument for differentiated physical education. The traditional one-size-fits-all model is pedagogically convenient but scientifically weak. Students differ in physical preparedness, previous sport experience, gendered expectations, health conditions, body image, digital literacy and motivation. Digital tools can either increase inequality or reduce it. They increase inequality when only technically skilled, physically strong or economically better-supported students benefit. They reduce inequality when the teacher uses them to provide alternative access, personal goals, adaptive tasks and private feedback. For example, a student with low endurance may still achieve success by improving regularity, technique and recovery discipline; a student with high fitness may be challenged through more complex self-regulation tasks; a student with anxiety may first complete video analysis privately before participating in group demonstration. The model also has implications for teacher training. A physical education teacher in the digital era needs at least four professional competencies: motor-methodical competence, motivational-psychological competence, digital-pedagogical competence and ethical-legal competence. Motor-methodical competence remains fundamental: no application can replace a teacher who understands movement technique, load progression and safety. Motivational-psychological competence allows the teacher to support autonomy, competence and relatedness, recognize anxiety and avoid humiliating assessment. Digital-pedagogical competence allows the teacher to select tools according to educational purpose, not according to fashion. Ethical-legal competence is necessary because physical education data may include sensitive information about health, body condition, performance and behavior. Institutions should therefore develop clear rules about informed consent, data minimization, storage, access and deletion. It is methodologically unacceptable to collect more student data than needed simply

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because technology makes collection easy. Another discussion point concerns the relation between physical culture and digital culture. Physical culture is not only a set of exercises; it is a value system that includes discipline, health responsibility, aesthetic movement, social cooperation, national traditions of sport and respect for the body. Digital culture, in contrast, is often fast, fragmented, comparative and commercially gamified. The task of higher education is not to surrender physical culture to digital culture but to educate digital culture through physical culture. In other words, students should learn to use technologies in a measured, ethical and health-oriented way. This is why reflective correction is a necessary component of the model. Reflection prevents the lesson from becoming a series of tasks without meaning. It asks the student to interpret: What did I feel during the exercise? What changed in my technique? What does this indicator mean? Why did my motivation decrease this week? How can I adjust my plan? Such questions form self-regulation. Without them, digital monitoring remains administrative. The proposed model is also compatible with the social mission of universities in Uzbekistan and similar educational contexts where modernization, healthy lifestyle promotion and competitive professional training are simultaneous priorities. Physical education can contribute to these priorities if it is presented not as a secondary subject but as an applied discipline that develops resilience, communication, self-control and health literacy. In many universities, however, physical education is still assessed mainly through attendance and normative performance. This approach misses the psychological dimension. A student may pass a standard but fail to develop a stable habit; another student may not reach a high standard but may achieve significant personal progress and develop responsible motivation. A more balanced assessment system should include personal improvement, reflective competence, safe technique and participation quality. Digital tools make such assessment easier, but only if criteria are clear. The article's model provides these criteria. At the same time, several limitations must be acknowledged. The model is theoretical and methodological; it requires empirical testing with different student groups, including students of physical culture, non-sport specialties, female and male students, students with health limitations and students with different digital access. Future research should measure changes in autonomous motivation, physical activity level, self-efficacy, anxiety and learning satisfaction before and after the implementation of the model. It should also compare low-tech and high-tech versions of digital physical education, because the

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most effective solution may not always be the most expensive one. There is also a need to study teacher readiness. A model can be scientifically elegant, but it will fail if teachers are overloaded, undertrained or deprived of basic infrastructure. For this reason, institutional implementation should be gradual. The first stage may include teacher seminars on motivation and digital ethics; the second stage may include simple diagnostic tools and reflective diaries; the third stage may include video feedback and activity monitoring; the fourth stage may include advanced analytics and adaptive platforms. This sequence is more realistic than sudden full digitalization. The general conclusion of the discussion is clear: digital physical education should be neither technophobic nor technocratic. Technophobia ignores real opportunities for personalization and feedback. Technocracy ignores the human meaning of movement. A scientifically responsible position is pedagogical digital humanism: technology is accepted, but only under the authority of educational purpose, psychological safety, ethical data use and the development of the student's active personality. Physical education, if organized in this way, can become one of the most effective disciplines for teaching young people how to live with technology without becoming passive servants of it. That is not a small task; it is practically a sprint, a marathon and a lesson in common sense at the same time.

CONCLUSION

The study substantiates that digital physical education in higher education should be understood as a motivational, psychodiagnostic and reflective system aimed at developing not only motor skills but also conscious attitudes toward health, self-regulation and responsible technology use. The selected topic is scientifically relevant because the digital environment has changed students' movement habits, communication patterns, attention, self-evaluation and emotional responses to learning. In such conditions, physical education cannot remain methodologically unchanged. It must preserve its bodily and humanistic essence while using digital tools to support individualized progress, psychological safety and long-term motivation. The article's main conclusion is that technology becomes useful in physical education only when it supports autonomy, competence, relatedness and reflection. If it is used merely for control, formal reporting or public comparison, it may weaken motivation and increase anxiety. The proposed four-component model--digital motor practice, motivational support, psychodiagnostic monitoring and

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reflective correction--offers a structured way to avoid this risk. It allows teachers to connect movement tasks with meaningful feedback, to identify student profiles, to correct pedagogical strategies and to assess progress more comprehensively. The model recommends five diagnostic criteria: motivational internalization, perceived motor competence, psycho-emotional safety, reflective self-regulation and digital responsibility. These criteria expand the assessment of physical education beyond attendance and normative performance. They help reveal whether the student is developing a stable and conscious relationship with physical activity. From a practical standpoint, the article recommends that higher education institutions introduce digital tools gradually and ethically, train teachers in motivational psychology and data culture, protect students' personal information, reduce humiliating forms of comparison, use reflective diaries and individual goals, and combine physical indicators with psychological-pedagogical interpretation. For students of physical culture, these recommendations have additional professional value because they prepare future specialists to work in a world where sport, health, education and technology are increasingly connected. Future empirical research should test the model in real university groups, compare different digital tools, measure motivational changes over time and clarify how digital physical education can be adapted for students with different levels of preparedness and health conditions. The final position is direct: the future of physical education should not be a screen instead of movement, but a smarter organization of movement through ethically used digital feedback and psychologically competent teaching.

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