



Heroic narrative-based Physical Education e-modules for fostering nationalism attitudes: a Rasch stacking analysis

Módulos electrónicos de Educación Física basados en narrativas heroicas para fomentar actitudes nacionalistas: un análisis de apilamiento de Rasch

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Abstract

Introduction: Contemporary physical education is expected to promote not only physical competence but also affective and character development, including nationalism attitudes. However, the integration of culturally grounded heroic narratives into digital physical education remains limited.

Objective: This study examined changes in nationalism attitudes following participation in heroic narrative-based physical education e-modules and investigated individual attitudinal trajectories through Rasch stacking analysis.

Methodology: A quasi-experimental one-group pre-test-post-test design was employed involving 21 university students in Bali. Nationalism attitudes were measured using the 20-item Nationalism Attitude Scale. Data were analysed using the Rasch Rating Scale Model, Rasch stacking procedures, and the Wilcoxon signed-rank test.

Results: Positive changes in nationalism attitudes were observed following participation in the intervention. The mean logit increased from 2.40 at pre-test to 3.35 at post-test, representing an average increase of 0.95 logits. The Wilcoxon signed-rank test also indicated significant differences between measurements ($p < .001$).

Conclusions: Heroic narrative-based physical education e-modules may represent a promising approach for fostering nationalism attitudes through reflective and value-oriented learning experiences. However, the findings should be interpreted cautiously because the one-group design does not permit strong causal inferences. Further studies involving larger samples and control groups are recommended.

Keywords

Heroic narratives; Physical education; nationalism attitudes; values-based education; character education; civic education.

Resumen

Introducción: Se espera que la educación física contemporánea promueva no solo la competencia física, sino también el desarrollo afectivo y del carácter, incluidas las actitudes nacionalistas. Sin embargo, la integración de narrativas heroicas con base cultural en la educación física digital sigue siendo limitada.

Objetivo: Este estudio examinó los cambios en las actitudes nacionalistas tras la participación en módulos electrónicos de educación física basados en narrativas heroicas e investigó las trayectorias actitudinales individuales mediante el análisis de apilamiento de Rasch.

Metodología: Se empleó un diseño cuasi experimental de un solo grupo con pretest y postest en el que participaron 21 estudiantes universitarios de Bali. Las actitudes nacionalistas se evaluaron mediante la Escala de Actitudes Nacionalistas de 20 ítems. Los datos se analizaron utilizando el Modelo de Escala de Calificación de Rasch, los procedimientos de apilamiento de Rasch y la prueba de rangos con signo de Wilcoxon.

Resultados: Se observaron cambios positivos en las actitudes nacionalistas tras la participación en la intervención. La media de los logits aumentó de 2.40 en el pretest a 3.35 en el postest, lo que representa un incremento promedio de 0.95 logits. La prueba de rangos con signo de Wilcoxon también indicó diferencias significativas entre las mediciones ($p < .001$).

Conclusiones: Los módulos electrónicos de educación física basados en narrativas heroicas pueden representar un enfoque prometedor para fomentar las actitudes nacionalistas mediante experiencias de aprendizaje reflexivas y orientadas a valores. Sin embargo, los resultados deben interpretarse con cautela, ya que el diseño de un solo grupo no permite establecer inferencias causales sólidas. Se recomiendan estudios futuros con muestras más amplias y grupos de control.

Palabras clave

Narrativas heroicas; Educación física; actitudes nacionalistas; educación basada en valores; educación del carácter; educación cívica.

Introduction

Contemporary physical education has increasingly expanded beyond the development of physical fitness and motor competence toward the cultivation of affective, social, and character-related outcomes. Recent perspectives in sport pedagogy emphasise that physical education should function not only as a medium for bodily movement but also as an educational space for developing responsibility, cooperation, discipline, resilience, and collective identity through embodied learning experiences (Bailey, 2018; Hellison et al., 2025). Within higher education contexts, physical education is increasingly expected to contribute to students' personal and social development by integrating cognitive, emotional, and behavioural dimensions into learning activities. This transformation reflects the broader shift in educational paradigms that position physical education as an integral component of holistic student development rather than merely a practice-oriented discipline focused on physical performance.

The growing complexity of social and cultural life in the digital era further strengthens the relevance of affective learning within physical education. The expansion of global media, digital communication, and transnational cultural influences has gradually changed how young people understand collective identity, citizenship, and social responsibility (Kaufmann, 2023; Loader & Loader, 2007). University students, particularly those belonging to the digital-native generation, are increasingly exposed to values that emphasise individualism and virtual interaction while reducing engagement with historical awareness and collective national identity. Several studies in Indonesia have indicated a weakening of students' emotional attachment to national values and declining appreciation toward national struggle and civic responsibility (Afrina et al., 2021; Purwaningsih & Kanukisya, 2023). In this situation, physical education possesses strategic potential to strengthen students' affective and social orientation through contextualised and value-oriented learning experiences.

Although the concepts of nationalism, patriotism, national identity, and civic identity are often used interchangeably, international literature distinguishes these constructs conceptually. Patriotism generally refers to emotional attachment and affection toward one's country (Kosterman & Feshbach, 1989). National identity concerns individuals' sense of membership and shared identity within a nation (Huddy & Khatib, 2007), whereas civic identity emphasizes civic responsibility and participation in collective life. In the present study, nationalism attitudes are conceptualized as a constructive and civic-oriented form of national attachment encompassing national identity, collective responsibility, social solidarity, and commitment to the common good. Therefore, the construct examined in this study is more closely aligned with constructive patriotism and civic-oriented nationalism than with exclusionary or superiority-based forms of nationalism (Schatz et al., 1999).

One educational approach that has considerable relevance in values-based physical education is the integration of heroic narratives into learning processes. Heroic narratives are closely associated with values such as courage, resilience, discipline, sacrifice, and collective struggle, which are also central to the broader educational goals of physical education. From the perspective of Social Cognitive Theory, individuals develop behavioural orientation through observation and identification with meaningful role models (Bandura, 2001). Narrative identity theory further explains that stories and symbolic figures contribute to the formation of personal meaning and moral identity (McAdams, 2013). In educational settings, heroic narratives therefore function not only as historical information but also as reflective pedagogical resources that encourage students to internalise values through emotional engagement and self-reflection.

The influence of heroic narratives on nationalism attitudes can be understood through several complementary psychological mechanisms. According to Social Cognitive Theory, values and behavioural orientations are acquired through observational learning and symbolic modelling (Bandura, 2001). Heroic figures provide meaningful examples that facilitate vicarious learning and encourage identification with socially desirable values. Narrative Identity Theory further suggests that stories help individuals construct meaning and integrate cultural values into their self-concept (McAdams, 2013). Through reflective engagement with heroic struggles, students may internalise values such as sacrifice, solidarity, and collective responsibility, which subsequently contribute to the development of national identity and positive nationalism attitudes. Transformative Learning Theory also emphasizes that critical reflection upon meaningful experiences can facilitate changes in perspectives and value systems (Mezirow, 1991).



Through this process, values acquired from heroic narratives may gradually be transferred into broader forms of national identity and civic commitment.

In the Indonesian context, local heroic figures provide culturally meaningful learning resources for strengthening value-oriented physical education. One prominent figure is I Gusti Ngurah Rai, whose leadership during the Long March and the Puputan Margarana battle reflected physical endurance, courage, discipline, and collective sacrifice (Aryani et al., 2025; Kertih, 2018). His struggle represented not only military resistance but also a strong moral commitment to national identity and collective responsibility (Arifin et al., 2026; Jumari et al., 2024; Sofiani et al., 2025). The integration of such heroic narratives into physical education learning can create embodied and contextual learning experiences that connect physical resilience with social and moral values. Consequently, heroic narrative-based learning may provide opportunities for students to understand nationalism not merely as a cognitive concept but also as a lived and reflective experience (Kertih, 2018).

The development of digital learning technology has further encouraged the transformation of physical education pedagogy. E-modules have increasingly been used in higher education because they provide flexible, interactive, and student-centred learning experiences (Aryani et al., 2025). Previous studies have shown that digital learning resources can improve engagement, reflective participation, and independent learning among students (Purwaningsih & Kanukisya, 2023; Yuliana Kua et al., 2025). In physical education contexts, however, many digital learning materials still focus predominantly on technical or cognitive aspects of learning, while affective and value-oriented dimensions remain relatively underdeveloped. Moreover, the incorporation of culturally grounded heroic narratives into physical education e-modules remains limited, particularly in relation to nationalism attitudes among university students.

Several previous studies have discussed nationalism education, digital learning, and character formation separately. Purwaningsih and Kanukisya (2023) reported that thematic digital books contributed positively to the strengthening of nationalism values among students. Afrina et al. (2021) highlighted the importance of historical learning materials in fostering students' nationalism attitudes, while Kertih (2020); (Saputra et al., 2024; Yuliana Kua et al., 2025) demonstrated that local wisdom-based e-modules enhanced reflective learning experiences. Nevertheless, several important limitations remain. First, research concerning nationalism attitudes is still predominantly conducted within civic education and historical learning contexts rather than physical education settings. Second, studies integrating heroic narratives into digital physical education learning remain rarely explored empirically. Third, although Rasch analysis has become increasingly common in educational measurement (Bond et al., 2020), the application of Rasch stacking analysis to identify individual attitudinal trajectories in physical education interventions remains very limited in international literature (Wright, 2003). Consequently, limited evidence is available regarding how culturally grounded heroic narratives embedded within digital physical education learning contribute to the development of nationalism attitudes and how such changes evolve at the individual level over time.

To address these gaps, the present study employs heroic narrative-based physical education e-modules guided by the BETA instructional framework (Building, Experiencing, Transforming, and Actualising) (Bruner, 1961; Kolb, 2014; Mezirow, 1991). The framework is conceptually aligned with Ki Hadjar Dewantara's educational philosophy, particularly the principles of the among system, which emphasises exemplary guidance, participatory learning, and supportive educational interaction. Through this framework, students are encouraged to move progressively from cognitive understanding toward reflective internalisation and behavioural actualisation of nationalism values through embodied and transformative learning experiences.

The novelty of this study lies in three principal aspects. First, the study integrates heroic narratives into physical education e-modules as a culturally grounded pedagogical approach for strengthening nationalism attitudes. Second, the study applies the BETA instructional framework within digital physical education to facilitate reflective and transformative learning processes. Third, the study examines individual-level attitudinal trajectories using Rasch stacking analysis, thereby providing a more nuanced understanding of changes in students' nationalism attitudes than conventional score-based approaches (Wright, 2003). Based on the theoretical framework and previous empirical findings, two hypotheses were proposed:



H1. Participation in heroic narrative-based physical education e-modules will be associated with positive changes in students' nationalism attitudes.

H2. Students will exhibit positive changes in Rasch person measures following participation in the intervention.

Accordingly, this study aims to investigate whether participation in heroic narrative-based physical education e-modules is associated with changes in nationalism attitudes and to examine individual attitudinal trajectories through Rasch stacking analysis.

Method

Research Design

This study employed a one-group quasi-experimental pretest-posttest design. Although this design enables the examination of changes following participation in the intervention, the absence of a control group limits the ability to establish causal relationships and to rule out alternative explanations such as maturation, repeated testing effects, time-related influences, and social desirability bias.

Participants

The participants consisted of 21 undergraduate students (Mage = 20.38 years, SD = 0.50), including 16 males and 5 females. All participants were second-semester students enrolled in the Physical Education course, and most reported previous experience in recreational sports activities. Participants were recruited through purposive sampling based on their enrolment in the Physical Education course and their willingness to participate. Although this approach facilitated access to participants who met the study criteria, it may introduce selection bias and limit the generalisability of the findings.

Although the study involved 21 participants, the sample size was considered adequate within the Rasch measurement framework. Bond et al. (2015); (Boone et al., 2014; Linacre, 1994; Wright & Masters, 1982) explained that Rasch analysis can generate stable item calibrations with relatively small samples when the instrument is well targeted. Furthermore, the stacking procedure generated 42 calibrated person records because each participant contributed two measurement occasions (pre-test and post-test) within a common logit continuum.

Instruments

The study employed the Nationalism Attitude Scale (NAS) developed by Kosterman and Feshbach (1989) to assess students' nationalism attitudes. The instrument consists of 20 items measured on a four-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). Since the original scale was developed in a different cultural context, it was translated into Indonesian and culturally adapted to ensure contextual appropriateness. Content validity was evaluated by an expert in citizenship education to ensure semantic equivalence and conceptual relevance for Indonesian university students. Following the adaptation process, the instrument was further examined using the Rasch model to evaluate its measurement properties (Bond et al., 2020; Engelhard & Wind, 2018). Therefore, the adapted instrument was considered appropriate for measuring nationalism attitudes among Indonesian university students.

Data Collection Procedure

Data collection was conducted through three stages: pre-test, intervention, and post-test. Initially, participants completed the Nationalism Attitude Scale to assess their baseline nationalism attitudes. Subsequently, the intervention was implemented using heroic narrative-based physical education e-modules guided by the BETA instructional framework (Building, Experiencing, Transforming, and Actualising). The intervention consisted of four sessions, each lasting approximately 90 minutes.

During the Building stage, students explored the heroic values embodied by I Gusti Ngurah Rai through digital learning materials, historical narratives, and reflective questions. The Experiencing stage involved participation in cooperative physical activities and team-based games designed to foster discipline,

teamwork, responsibility, and perseverance. In the Transforming stage, students engaged in group discussions and reflective exercises to connect the values derived from heroic narratives with contemporary social and national issues. Finally, the Actualising stage encouraged students to apply these values in everyday life through collaborative assignments and self-reflection activities. The integration of heroic narratives and physical activities was intended to provide embodied and transformative learning experiences that support the development of nationalism attitudes. Upon completion of the intervention, participants completed the same Nationalism Attitude Scale as a post-test to examine changes in nationalism attitudes following participation in the intervention.

Table 1. Structure of the Heroic Narrative-Based Physical Education Intervention Across the BETA Stages

Session	BETA Stage	Main Activities
Session 1	Building	Introduction to I Gusti Ngurah Rai, heroic narratives, and nationalism values through digital modules and reflective questions
Session 2	Experiencing	Cooperative games and physical activities emphasizing teamwork, discipline, and responsibility
Session 3	Transforming	Group discussions and reflective activities linking heroic values with contemporary social and national issues
Session 4	Actualising	Collaborative assignments and self-reflection to apply nationalism values in everyday life

Ethics Approval

This study was conducted in compliance with established ethical standards, with strict measures taken to ensure the confidentiality of all participants. Informed consent was obtained from all participants prior to their involvement in the study, including consent for the use and publication of the research findings. Ethical approval Number: 03.0164/KEP-Unmas/IV/2026 was obtained from Komite Etik Penelitian (KEP) Universitas Mahasaraswati Denpasar.

Data analysis

Data analysis was conducted using the Rasch Rating Scale Model (RSM) through Winsteps software to examine students' nationalism attitudes following the implementation of heroic narrative-based physical education e-modules. Rasch measurement was selected because it enables the transformation of ordinal Likert-scale responses into interval-level logit measures while simultaneously estimating item difficulty and person ability within a common measurement continuum (Andrianie et al., 2025; Bond et al., 2015; Boone et al., 2014; Folastrri et al., 2023; Sofyan et al., 2024). Compared with conventional statistical approaches, the Rasch model provides more precise information regarding individual attitudinal trajectories and response consistency across measurement occasions.

Data collection was conducted at two measurement points, namely pre-test and post-test, using the same Nationalism Attitude Scale consisting of 20 polytomous items. The use of identical instruments at both measurement occasions enabled longitudinal comparison of changes in students' nationalism attitudes following the intervention process. Because the instrument employed a four-point Likert response format, the data were analysed using the Rasch Rating Scale Model appropriate for polytomous response categories (Linacre & Linacre, 2012).

To examine changes in students' nationalism attitudes, this study employed the Rasch stacking technique. In the stacking procedure, pre-test and post-test responses were vertically combined into a single calibrated dataset while item parameters remained anchored within the same logit continuum (Herrmann-Abell et al., 2013; Wright, 2003). Through this approach, each participant generated two calibrated person measures representing attitudes before and after intervention, thereby enabling direct comparison of individual attitudinal trajectories across measurement occasions. The stacking procedure produced 42 calibrated person records derived from 21 participants who completed both pre-test and post-test measurements.

Several Rasch analyses were subsequently performed, including the evaluation of person and item reliability, separation indices, item fit statistics, and item difficulty hierarchy. Item fit was assessed using Infit Mean Square (Infit MNSQ), Outfit Mean Square (Outfit MNSQ), and standardized fit statistics (ZSTD) to determine the extent to which individual items conformed to the expectations of the Rasch model (Bond et al., 2015; Boone et al., 2014). Wright Maps and Guttman scalograms were further employed to

visualise changes in person distribution and response patterns across measurement occasions. In addition, the Wilcoxon signed-rank test was used to examine the statistical significance of differences in nationalism attitudes between pre-test and post-test measurements.

Results

The findings of this study are presented to explain changes in nationalism attitudes following the implementation of heroic narrative-based physical education e-modules analysed through Rasch stacking procedures. The analysis focused not only on the magnitude of attitudinal change at the group level but also on the transformation of individual response patterns across pre-test and post-test measurements. By calibrating all responses within a common logit continuum, the stacking approach enabled a more comprehensive examination of students' attitudinal trajectories during the intervention process.

Table 2 presents the summary statistics of the stacked Rasch model used to analyse nationalism attitudes following the implementation of heroic narrative-based physical education e-modules. Overall, the findings indicate that the instrument demonstrated strong psychometric quality and functioned consistently across pre-test and post-test measurements. The mean measure value of 2.44 logits suggests that participants generally exhibited nationalism attitudes above the average item difficulty level. The item reliability value of 0.81 indicates good stability of item calibration, while the item separation index of 2.09 demonstrates that the instrument was capable of distinguishing several levels of item difficulty. In addition, the person reliability value of 0.98 and person separation index of 7.59 indicate excellent consistency and strong sensitivity of the model in differentiating participants' nationalism attitudes across measurement occasions. Furthermore, the Cronbach Alpha (KR-20) coefficient of 0.99 reflects extremely high internal consistency between participant responses and instrument items. However, this value should be interpreted cautiously, as very high reliability coefficients may indicate redundancy or conceptual overlap among some items. Therefore, although the instrument demonstrated strong measurement properties, future studies may consider examining whether certain items assess highly similar aspects of nationalism attitudes. Overall, these findings suggest that the stacked Rasch model provided a stable and reliable framework for examining changes in nationalism attitudes following the intervention.

Table 2. Summary Statistic

Component	Measure
Mean Measure	2.44
Item Reliability	0.81
Person Reliability	0,98
Cronbach Alpha (KR-20) person raw score "test" reliability	0,99
Item Separation Index	2.09
Person Separation Index	7.59

Table 3. Individual-Level Attitudinal Trajectories

Person	Pre-test Measure	Post-test Measure
P1	3.98	4.78
P2	3.15	1.82
P3	2.39	2.73
P4	2.89	2.22
P5	2.64	4.78
P6	2.14	1.82
P7	2.64	1.19
P8	2.64	1.82
P9	1.62	4.78
P10	1.62	4.78
P11	2.39	1.82
P12	1.88	3.54
P13	1.62	3.54
P14	1.62	4.78
P15	2.39	4.78
P16	1.88	3.54
P17	2.64	4.78
P18	2.64	1.82
P19	2.64	4.78
P20	2.64	4.78

Table 3 indicates that the implementation of the heroic narrative-based physical education e-module generally contributed to positive changes in students' nationalism attitudes at the individual level. Although the magnitude of change varied among participants, the overall pattern demonstrates a tendency toward higher post-test person measures following the intervention, suggesting positive changes in nationalism attitudes following participation in the learning process. Nevertheless, several participants exhibited lower post-test measures or only minimal changes, indicating that the effects of the intervention were not entirely uniform across individuals. These negative or resistant cases suggest that individual differences, levels of engagement, and response consistency may have influenced the extent to which nationalism values were internalised. Therefore, the findings should be interpreted as reflecting an overall tendency toward improvement accompanied by considerable individual variation rather than uniform gains across all participants.

To further examine the transformation of students' nationalism attitudes following the intervention, response patterns were analysed using a Guttman scalogram (Figure 1) based on the Rasch stacking procedure. This visualisation provides a detailed representation of how participants' responses shifted between pre-test and post-test measurements across the nationalism attitude items. Overall, the post-test response patterns showed a greater tendency toward higher response categories, indicating stronger endorsement of nationalism-related values after participation in the heroic narrative-based physical education e-module. Nevertheless, the magnitude of change varied across participants, with some individuals exhibiting substantial improvements, whereas others showed only limited or even negative changes. These findings suggest that the internalisation of nationalism values occurred differently across individuals and highlight the presence of heterogeneous attitudinal trajectories following the intervention.

Figure 1. Guttman Scalogram of Pretest–Posttest Responses Based on Rasch Stacking Analysis

GUTTMAN SCALOGRAM OF RESPONSES:						
PERSON	ITEM	1	2	1111	1111	Test Measure Pre-Post-Test Difference
		12346597308285691470				
14		+33333333123221212222	14	Pre	1.62	3.16
14		+44444444444444444444	14	Post	4.78	
10		+33223233322222222222	10	Pre	1.62	3.16
10		+44444444444444444444	10	Post	4.78	
9		+23333222222222323222	9	Pre	1.62	3.16
9		+44444444444444444444	9	Post	4.78	
17		+333233222323232222	17	Pre	2.64	2.14
17		+44444444444444444444	17	Post	4.78	
5		+333222223223332223	5	Pre	2.64	2.14
5		+44444444444444444444	5	Post	4.78	
19		+332333222322322222	19	Pre	2.64	2.14
19		+44444444444444444444	19	Post	4.78	
15		+332332223232322222	15	Pre	2.39	2.39
15		+44444444444444444444	15	Post	4.78	
		12346597308285691470				



Figure 2. Wright Map Pretest and Posttest

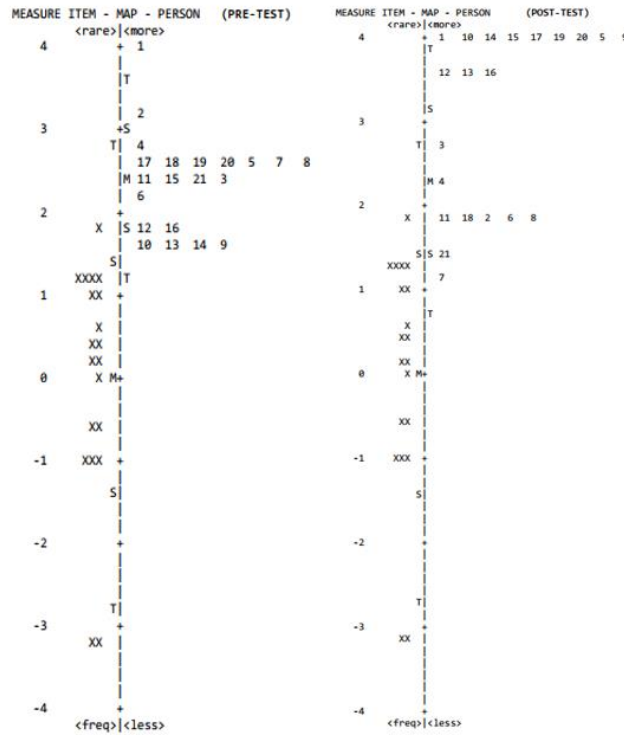


Figure 2 presents the Wright Map comparison between the pre-test and post-test measurements of students' nationalism attitudes following the implementation of the heroic narrative-based physical education e-module. During the pre-test stage, most participants were positioned around the lower and moderate regions of the logit continuum, indicating relatively moderate endorsement of nationalism-related values. After the intervention, the distribution of person measures shifted toward higher logit levels, reflecting a greater concentration of participants at higher locations on the continuum. This pattern indicates an overall tendency toward stronger nationalism attitudes following participation in the learning intervention. To complement the visual interpretation of the Wright Map, aggregated descriptive statistics were also examined. The mean person measure increased from 2.40 logits at pre-test to 3.35 logits at post-test, representing an average increase of 0.95 logits. These descriptive findings provide quantitative support for the upward shift in person distribution observed in the Wright Map and further indicate positive changes in students' nationalism attitudes after participation in the heroic narrative-based physical education e-module.

Table 4. Item Difficulty Hierarchy of the Nationalism Attitude Scale

No	Item	Item Indicator	Measure (Logit)	Infit MNSQ	Outfit MNSQ	Infit ZSTD	Difficulty Level
1	I9	Preservation of Balinese culture and traditions	1.21	1.36	1.39	1.43	Most Difficult
2	I10	Low involvement in cultural preservation (-)	1.21	.52	.49	-2.40	Most Difficult
3	I11	Love for Indonesia	1.21	.78	.71	-.92	Most Difficult
4	I17	Social and environmental concern	0.91	.76	.90	-1.13	Difficult
5	I14	Unwillingness to contribute to national development (-)	0.62	.58	.51	-2.37	Difficult
6	I15	Appreciation of diversity and unity	0.62	1.27	1.21	1.30	Difficult
7	I16	Limited appreciation of diversity (-)	0.62	.66	.59	-1.83	Difficult
8	I18	Indifference to social and environmental issues (-)	0.47	.78	.68	-1.16	Moderately Difficult
9	I8	Non-participation in commemorative activities (-)	0.32	.96	.89	-.14	Moderately Difficult
10	I12	Weak patriotic feelings (-)	0.32	.84	.73	-.81	Moderately Difficult
11	I13	Contribution to national development	0.32	1.45	1.81	2.14	Moderately Difficult
12	I20	Limited contribution to promoting Bali and heroic values (-)	0.02	.73	.66	-1.62	Moderate
13	I7	Participation in commemorative activities	-0.14	1.07	.98	.46	Moderately Easy



14	I19	Developing ideas to promote Bali and heroic values	-0.14	1.46	2.26	2.33	Moderately Easy
15	I5	Inspiration from heroic values	-0.46	1.01	1.16	.09	Easy
16	I4	Limited understanding of I Gusti Ngurah Rai's history (-)	-0.63	1.16	1.68	.83	Easy
17	I3	Knowledge of I Gusti Ngurah Rai's history	-1.00	1.07	1.09	.39	Very Easy
18	I6	Lack of inspiration from heroic values (-)	-1.00	1.00	.84	.07	Very Easy
19	I2	Indifference toward I Gusti Ngurah Rai's role (-)	-2.04	1.05	2.28	.25	Easiest
20	I1	Pride in I Gusti Ngurah Rai's role	-2.44	.85	1.98	-.10	Easiest

Table 4 presents the hierarchy of item difficulty within the Nationalism Attitude Scale based on the Rasch stacking calibration. Brief content indicators are presented in Table 4 to clarify the substantive meaning represented by each item, while the full item statements are provided in Table S1. The results indicate that items reflecting higher levels of national commitment, civic participation, and collective responsibility tended to be more difficult for participants to endorse, whereas items associated with basic forms of national identity and appreciation of heroic values were relatively easier to agree with. This pattern suggests that students more readily expressed symbolic and affective dimensions of nationalism than attitudes requiring deeper behavioural commitment and social responsibility. Nevertheless, the overall distribution of person measures after the intervention showed improved endorsement across various levels of item difficulty, suggesting an overall tendency toward stronger nationalism attitudes following participation in the heroic narrative-based physical education e-module.

After examining item difficulty and fit statistics, Differential Item Functioning (DIF) analysis was performed to evaluate the stability of item functioning across pre-test and post-test measurements (Table 5). Overall, most items did not exhibit significant DIF, indicating that the Nationalism Attitude Scale functioned consistently across measurement occasions. However, three items (I2, I4, and I19) showed statistically significant DIF, suggesting that these items functioned somewhat differently across the two measurement occasions. Nevertheless, the overall pattern indicates that the measurement structure remained largely stable over time, supporting the interpretation that the observed changes in person measures primarily reflected changes in participants' nationalism attitudes rather than systematic item bias. Future studies involving larger samples are recommended to further examine the stability of these items.

Table 5. Differential Item Functioning Across Pre-Test and Post-Test Measurements

Item	DIF Contrast	S.E.	t-value	p-value	Interpretation
I1	-2.36	1.33	-1.78	.0889	No DIF
I2	-3.18	1.13	-2.82	.0086	Significant DIF
I3	-0.54	1.17	-0.46	.6489	No DIF
I4	-1.91	0.85	-2.25	.0351	Significant DIF
I5	-0.92	0.92	-1.01	.3273	No DIF
I6	-0.54	1.17	-0.46	.6489	No DIF
I7	0.49	1.15	0.43	.6770	No DIF
I8	0.04	0.91	0.05	.9646	No DIF
I9	-0.09	0.80	-0.12	.9088	No DIF
I10	1.39	0.95	1.47	.1563	No DIF
I11	-0.09	0.80	-0.12	.9088	No DIF
I12	0.04	0.91	0.05	.9646	No DIF
I13	-0.69	0.82	-0.84	.4105	No DIF
I14	3.00	1.92	1.57	.1433	No DIF
I15	1.49	1.16	1.29	.2173	No DIF
I16	1.49	1.16	1.29	.2173	No DIF
I17	0.90	0.93	0.97	.3444	No DIF
I18	0.25	0.91	0.28	.7846	No DIF
I19	-1.91	0.79	-2.43	.0243	Significant DIF
I20	0.68	1.15	0.60	.5610	No DIF

Note. Differential Item Functioning (DIF) analysis was conducted to examine the stability of item functioning across pre-test and post-test measurements. Significant DIF was identified when $p < .05$

Furthermore, the Wilcoxon signed-rank test revealed a statistically significant difference between pre-test and post-test measurements ($p < .001$), indicating an overall tendency toward stronger nationalism attitudes following participation in the intervention. Nevertheless, the observed improvements should

be interpreted as changes associated with participation in the intervention rather than as definitive evidence of causality.

Table 6. Wilcoxon Signed-Rank Test Results

Comparison	Test	p-value
Pre-test vs. Post-test	Wilcoxon signed-rank test	< .001

Note. $p < .001$ indicates a statistically significant difference between pre-test and post-test scores.

Discussion

The findings of this study indicate positive changes in students' nationalism attitudes following participation in the heroic narrative-based physical education e-modules. The increase in post-test person measures, supported by the Wilcoxon test, suggests that participation in the intervention was associated with positive attitudinal changes. These positive changes appear to be closely related to the integration of heroic narratives into physical education activities, which enabled students to experience nationalism not merely as an abstract ideological concept, but as an emotionally engaging and behaviourally meaningful value. Through stories of heroism, sacrifice, and collective struggle, students were encouraged to develop reflective connections between physical participation, national identity, and social responsibility (Hargreaves, 2013; Mekonnen & Hindeya, 2012).

The observed changes may also be understood through the role of heroic narratives as symbolic modelling mechanisms. According to Bandura (2001), individuals develop values and behavioural orientations through observational learning and identification with meaningful role models. In this study, the heroic narratives of national figures such as I Gusti Ngurah Rai likely functioned as symbolic representations of courage, sacrifice, discipline, and collective commitment. When these narratives were integrated into physical education learning, students did not only receive historical information cognitively, but also emotionally identified with the values represented in the stories (Laszlo, 2013; Mavilidi et al., 2018; Wrench & Garrett, 2012). This process may explain why students demonstrated stronger endorsement of nationalism-related attitudes following the intervention.

Another important finding is that the observed changes may have been supported by the embodied nature of physical education learning (Aartun et al., 2022; Jespersen & He, 2015; Prevandos & Martin, 2022; Rosyida et al., 2022). Unlike conventional classroom instruction, physical education allows students to engage physically, emotionally, and socially during the learning process. Bailey (2018) explained that physical education contributes to affective and moral development because students experience values directly through participation, cooperation, discipline, and collective engagement. In the present study, heroic narratives were not presented merely as reading materials, but were integrated into reflective physical learning activities that connected bodily movement with national values (Conle & Boone, 2008; VanSledright, 2008). Consequently, students were able to internalise nationalism attitudes through experiential and participatory learning rather than through passive memorisation.

The Wright Map analysis further supports the observed positive changes by showing a clear upward shift in students' post-test distributions compared with the pre-test condition (Combrinck et al., 2017; Uzun & Ogretmen, 2021). This shift indicates that students became more capable of endorsing nationalism-related items after participating in the heroic narrative-based learning activities (Wati et al., 2024; Wright, 2003). In addition, the Guttman scalogram analysis demonstrated increasingly consistent response patterns during the post-test stage. These findings suggest that the intervention did not only increase students' agreement toward nationalism values quantitatively, but also strengthened the consistency and stability of their attitudinal orientations. Such consistency is important because nationalism attitudes are closely related to internalised values rather than temporary cognitive responses.

The DIF analysis also provides additional support for the use of Rasch stacking procedures in examining attitudinal change. Most items demonstrated stable functioning across the two measurement occasions, indicating that the observed changes in person measures were unlikely to be attributable to measurement bias. Although three items showed significant DIF, the overall pattern suggests that the Nationalism Attitude Scale maintained satisfactory temporal stability. This evidence strengthens the credibility of the Rasch stacking results and suggests that the observed changes in person measures were largely

associated with changes in participants' nationalism attitudes rather than substantial inconsistencies in item functioning. Nevertheless, future studies with larger samples are recommended to further investigate the stability of these items.

The hierarchy of item difficulty also reveals how the intervention influenced different dimensions of nationalism attitudes. Items related to symbolic nationalism, such as national identity and respect for national symbols, were relatively easier for students to endorse, whereas items involving sacrifice, civic responsibility, and collective commitment were more difficult. However, the post-test findings indicate that students showed stronger endorsement even toward more demanding nationalism dimensions after the intervention. This suggests that heroic narrative-based physical education learning may help students move beyond symbolic nationalism toward more reflective and participatory forms of national commitment. In this context, the heroic narratives appear to function as moral and emotional bridges that connect personal experiences with broader civic and collective values (Conle & Boone, 2008; Haste & Bermúdez, 2017).

The observed positive changes may also be associated with the integration of the BETA framework (Building, Experiencing, Transforming, and Actualising) within the e-module design. The Building phase allowed students to construct initial understanding regarding nationalism values, while the Experiencing phase facilitated emotional and embodied engagement through physical participation. The Transforming phase encouraged students to reflect critically on the meaning of sacrifice, solidarity, and collective identity, whereas the actualising phase directed students toward behavioural internalisation of nationalism values in daily life. This sequential learning process aligns with transformative learning theory, which emphasises that meaningful attitudinal change occurs when learners critically reinterpret values through reflective experiences (Mezirow, 1991). Therefore, the observed positive changes may have been associated not only with the content itself but also with the pedagogical structure that facilitated reflective and experiential learning processes.

Although the findings demonstrated positive changes in students' nationalism attitudes following participation in the heroic narrative-based physical education e-module, these results should be interpreted with caution. Given the one-group pre-test-post-test design employed in this study, the observed improvements cannot be attributed exclusively to the intervention, as alternative explanations such as maturation, repeated testing effects, and time-related influences cannot be entirely ruled out. Therefore, the present findings provide evidence of observed changes associated with participation in the intervention rather than definitive evidence of causality. Future studies employing control groups and larger samples are needed to establish stronger causal inferences regarding the contribution of heroic narrative-based physical education e-modules to the development of nationalism attitudes.

In addition, the present findings should be interpreted in light of several methodological considerations. Although most participants demonstrated higher post-test measures, several students exhibited limited or even negative changes following the intervention, suggesting that the internalisation of nationalism values did not occur uniformly across individuals. Variations in prior experiences, levels of engagement, and personal interpretations of heroic narratives may have influenced the extent of attitudinal change. Furthermore, because nationalism attitudes were assessed using self-report questionnaires, socially desirable responding may have affected participants' responses toward values that are generally viewed positively within society. The improvements observed following the intervention may also have been influenced by the Hawthorne effect, whereby participants modified their responses because they were aware of being involved in a research setting. In addition, the use of purposive sampling may have introduced selection bias and limited the generalisability of the findings beyond the specific context of the participants included in this study.

From a methodological perspective, the use of Rasch stacking analysis provided several advantages for examining changes in nationalism attitudes. By calibrating pre-test and post-test responses within a common logit continuum, the approach enabled direct comparison of individual trajectories and offered a more detailed understanding of attitudinal changes than conventional score-based analyses (Herrmann-Abell et al., 2013; Wright, 2003). Furthermore, the combination of Wright Maps and Guttman scalograms facilitated visual interpretation of changes in response patterns across measurement occasions. Nevertheless, several limitations should also be acknowledged. In addition, the interpretation of Rasch stacking results assumes that item calibrations remain sufficiently stable across measurement occasions, and therefore changes in person measures should be interpreted cautiously,



particularly when sample sizes are limited. Although Rasch measurement can produce stable estimates with relatively small samples (Bond et al., 2015; Boone et al., 2014; Linacre, 1994), the sample size of 21 participants limits the external validity and generalisability of the findings. In addition, changes in person measures should be interpreted as indicators of observed attitudinal tendencies rather than as evidence of permanent psychological transformation. Therefore, future studies involving larger and more diverse samples are needed to strengthen the robustness and generalisability of the findings.

Overall, the findings suggest that heroic narrative-based physical education e-modules may represent a promising pedagogical approach for fostering nationalism attitudes among university students. The integration of heroic stories, embodied physical learning, reflective activities, and digital learning media appeared to provide meaningful educational experiences that may support students' internalisation of nationalism values. These findings further highlight the potential of culturally grounded physical education learning in promoting affective, moral, and civic development within higher education contexts.

Conclusions

The findings of this study indicate that participation in heroic narrative-based physical education e-modules was associated with positive changes in university students' nationalism attitudes. The Rasch stacking analysis revealed an overall tendency toward stronger endorsement of nationalism-related values following the intervention. These findings suggest that the integration of heroic narratives, embodied physical learning, reflective activities, and digital learning media may represent a promising pedagogical approach for promoting affective, moral, and civic development in higher education contexts. However, because the study employed a one-group pre-test–post-test design, the observed improvements should be interpreted as evidence of positive changes associated with participation rather than definitive evidence of causality. Future studies involving control groups, larger samples, and longitudinal designs are needed to provide stronger evidence regarding the contribution of heroic narrative-based physical education learning to the development of nationalism attitudes.

Several limitations should be acknowledged when interpreting the present findings. The absence of a control group, the relatively small sample size, the use of purposive sampling, and the reliance on self-report measures may limit the generalisability and causal interpretation of the results. In addition, the culturally specific context of Bali and the lack of longitudinal follow-up restrict the transferability of the findings and prevent conclusions regarding the long-term sustainability of the observed attitudinal changes. Future research should address these limitations by incorporating larger and more diverse samples, multimethod assessments, and longitudinal designs.

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