Biomechanical Demands and Motor Skill Acquisition in the Performance of the Gaddang Folk Dance "Ope Manque Wayi"

Dr. Dino A. Reyes

College of Education, Ifugao State University, Lagawe, Ifugao, Philippines

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ABSTRACT

The biomechanical requirements and motor learning processes associated with executing Ope Manque Wayi, a traditional Gaddang courtship dance that originated in Nueva Vizcaya, are examined in this study. The dance, which has its roots in themes of love, treachery, and resiliency, uses a variety of physical and motor abilities in addition to embodying cultural narratives. In addition to evaluating how inexperienced dancers advance through the phases of motor learning, the study aims to investigate the movement efficiency, joint articulation, muscle engagement, and balancing mechanics displayed during the dance performance.

A combination of observational scoring rubrics, dancer notebooks, and video-based motion analysis was used in this mixed-method approach. During a four-week training program, sixteen student participants, ages 17 to 21, who had no prior experience with traditional dance, had their biomechanical execution and motor learning progress monitored. Particular motions including the waltz turns, engaño step, kumintang kneel, and malong spin were assessed for postural control, rhythmic timing, and muscle coordination.

According to the results, the dance requires a high degree of proprioceptive coordination, lower limb strength, dynamic balance, and spatial awareness. By the end of the training, participants' timing, posture, and expressive quality had significantly improved, demonstrating a move from cognitive to autonomous learning stages.

The results support the inclusion of Ope Manque Wayi in physical education and therapeutic movement programs as a culturally relevant performance and a useful tool for developing motor skills.

Keywords: Human movement, folk dance, biomechanics, motor learning, Gaddang culture

INTRODUCTION

Folk dances are ageless manifestations of historical continuity, cultural narratives, and collective identity. Folk dances, which are frequently transmitted orally and performed, capture a people's customs, courtship, values, and mythologies (Nolasco, 2012; Fernandez, 1996). Traditional dances are live archives of indigenous knowledge and collective experience in the Philippines, where more than 100 ethnolinguistic groups maintain distinctive heritage traditions. The Gaddang courtship dance Ope Manque Wayi, which translates to "Where, my beloved?," is one example of this cultural expression."in the tongue of Gaddang. The folk song about love, abandonment, and emotional fortitude served as the inspiration for the dance, which was researched by Alpha Ambatali and choreographed by Dr. Dino A. Reyes. It uses intricate gestures, bodily movements, and rhythmic patterns to visually tell the story of a journey from longing to empowerment.

The majority of folk dances are studied for their sociocultural significance, however human movement science is beginning to recognize that these dances can also be used as teaching tools. Many aspects of physical function, including as agility, balance, coordination, strength, and proprioception, are used in traditional dance. Despite this, not much research has thoroughly examined traditional dances as structured platforms for biomechanical study and motor learning, particularly in indigenous societies.

Folk dancing serves as both an embodied action and a cultural artifact. Alejandro (1980) asserts that traditional dances strengthen social links within communities while preserving spiritual ideas and legends. Rituals, chants,

and courtship dances such as Ope Manque Wayi are used by the Gaddang people to convey emotional stories. More recent studies contend that folk dances also demand and develop complex human movement capabilities, whereas older works primarily focused on ethnography or anthropology (Baradas, 1982; de la Peña, 2001). (Dela Cruz, 2018).

Although the promotion of national identity through dances such as Singkil, Tinikling, and Binuyugan has been assessed in Philippine education (Toledo, 2017), their biomechanical qualities, motor skill development, and movement efficiency have rarely been assessed using scientific methods. A gap in educational kinesiology and movement pedagogy is caused by the paucity of scientific research on the quality of folk dance movements.

According to Koutedakis and Jamurtas (2004), dancing is a biomechanically demanding exercise that necessitates control over the body's joints, levers, and planes of movement. Flexibility, muscular endurance, and coordination are necessary for the closed and open kinetic chain actions that are frequently used in traditional dance movements. Particular research shows that postural alignment, joint loading, and angular momentum are essential to dance performance (Laws, 2002; Wilson et al., 2007).

Coordination between the upper and lower limbs is required for motions like brush steps, native waltzes, slide-step turns, and dynamic spins in folk dances like Ope Manque Wayi. The combination of expressive and motor function is demonstrated by the employment of rhythmic foot movements and prolonged arm motions. According to research by Schmitt (2014), consistent practice improves kinesthetic efficiency and balance, two essential elements of biomechanical efficacy, even in non-professional dance styles.

Through the stages of cognitive, associative, and autonomous learning, people develop and hone their movement patterns (Fitts & Posner, 1967). As dancers advance from mechanical repetition to flowing performance, this learning curve can be seen in dance education. Research by Rudd et al. (2015) and Magill & Anderson (2017) highlights the value of motor learning frameworks in organizing dance education, especially for novices.

It is also commonly known that rhythm, mental imagery, and feedback can speed up the acquisition of new skills (Schmidt & Lee, 2019). Dance improves motor control, memory retention, and emotional involvement, particularly when taught with cultural context and storytelling (Bläsing et al., 2012).

Few research have examined the ways in which traditional dances in the Philippines promote the development of motor skills. The majority of the literature now in publication views dance as a cultural or performing act, undervaluing the kinesthetic learning component. By evaluating how students adjust to the technical demands of Ope Manque Wayi and which biomechanical components have the biggest impact on their development, this study aims to close that gap.

Globally, there has been an increase in the use of cultural dance in movement therapy and education. Traditional dances have been shown to improve psychological well-being, cognitive flexibility, and physical literacy (Kiefer & Riley, 2020; Lima et al., 2016). The elderly, people recuperating from motor impairments, and populations with developmental coordination issues have all found success with them.

This is in line with Filipino cultural theorists like Lumbera (1998), who support the incorporation of indigenous knowledge systems, such folk dances, in the curriculum as a means of decolonizing it. In this sense, Ope Manque Wayi is not just a work of art but also a possible movement instrument that combines comprehensive motor learning with cultural revival.

Research on biomechanical and motor learning in indigenous Philippine dances, especially in Northern Luzon, is conspicuously lacking, despite the widespread use of traditional dances in cultural education. As of right now, there is no literature that empirically analyzes Ope Manque Wayi's performance using techniques like joint articulation analysis, movement sequencing, and neuromuscular coordination. Furthermore, there is currently little evidence supporting the educational advantages of teaching these dances in a structured motor learning context.

METHODOLOGY

The human movement dynamics involved in the performance of the Gaddang folk dance Ope Manque Wayi were investigated in this work using a mixed-method strategy that included biomechanical analysis and motor behavior observation. Each of the sixteen student dancers, who ranged in age from 17 to 21, performed the dance for the first time. Since none had previously had official folk dance training, the results would accurately depict the development of motor learning. The participants in the intervention received comprehensive teaching in the entire choreography over the course of four weeks. Because each session concentrated on a distinct choreographic part, researchers were able to identify and examine biomechanical components as well as monitor patterns of skill growth.

To capture both qualitative and quantitative data, several tools were utilized. First, weekly dance performances were recorded using a motion analysis system based on video, which allowed for a frame-by-frame examination of posture alignment, limb coordination, and joint articulation. Second, important muscle groups that were recruited during particular sequences, like waltz turns, engaño steps, and floor transitions, were identified using anatomical movement breakdown sheets. Standard kinesiology concepts served as a reference for these sheets to guarantee precision in determining joint mechanics and muscle recruitment. Third, participants kept weekly learning reflection notebooks in which they documented their difficulties, successes, and bodily experiences pertaining to timing, balance, and coordination. Lastly, the researchers used a movement scoring rubric to assess dancers on three important performance metrics: rhythmic timing, motor coordination, and dynamic balance. To evaluate progressive motor development, rubrics were scored once a week.

As students performed certain dance phrases during each session, researchers watched how their joints moved and which muscles were used. These observations were then contrasted with the video recordings and rubric scores in order to identify patterns in the development of the students. The combination of film footage, reflective writing, and professional observation allowed for a thorough understanding of how novice dancers improved their movement fluency and biomechanical efficiency during the performance of Ope Manque Wayi. This methodological triangulation supported the validity of findings related to the cognitive and physical aspects of motor learning in a culturally varied dance context.

RESULTS AND DISCUSSION

Biomechanical Observations

Movement Segment	Key Muscles Used	Joint Involvement	Coordination Type
Slide Step Turns	Quadriceps, Glutes	Knee, Hip	Dynamic Balance
Engaño Steps	Core, Ankle Stabilizers	Spine, Ankles	Sequential Control
Kumintang Kneel	Deltoids, Hip Flexors	Shoulder, Knee	Flexibility & Flow
Waltz Turn	Calves, Abdominals	Ankle, Trunk	Rhythm & Rotation
Malong Spin	Obliques, Shoulder Girdle	Spine, Arm	Spatial Orientation

Over the course of four weeks, the examination of Ope Manque Wayi showed strong motor learning development and rich biomechanical demands. The study documented how dancers improved in movement execution, postural control, and expressive fluency through video-based motion analysis, anatomical observation, and reflective journaling. These findings closely matched Fitts and Posner's (1967) definition of the Cognitive, Associative, and Autonomous phases of classical motor learning.

Participants in the Cognitive Stage put a lot of effort into learning the dance's steps and structure. During the first week of training, this stage was most noticeable, as dancers frequently stopped, stumbled, and relied on teacher signals for timing and movement guidance. For instance, many dancers had uneven dynamic balance when executing the Slide-Step Turns, depending on peers' or teachers' visual cues for direction. Inefficient activation of hip and knee joints, as well as muscles like the quadriceps and glutes, frequently resulted in overcompensation in arm motions and poor posture. This stage's observations verified an excessive dependence on modeling, irregular rhythms, and a lack of expressive integration.

Notable progress was noted as students moved into the Associative Stage (during the second week). Particularly in the Waltz Turns, where calves and abdominals worked more fluidly with ankle and trunk rotation, dancers started more regularly coordinating their movements to the music. Rotational coordination and postural stability were needed for this phase, and as participants honed their proprioceptive awareness and rhythmic sensitivity, these skills increased. Peer mirroring also appeared, as dancers synchronized their tempo and improved their posture by referring others. Learners demonstrated improved weight transfer and sequential control in Engaño Steps, which incorporates core and ankle stabilizers. They also demonstrated increasing autonomy in making decisions throughout transitions.

The majority of participants advanced to the Autonomous Stage by weeks three and four. During this stage, there was a noticeable improvement in the level of confidence, synchronization, and emotional expression in the performance. Dancers used their deltoids, hip flexors, knees, and shoulders with more control as they moved fluidly in and out of floorwork during the Kumintang Kneel portion. Flow and flexibility, which were formerly obstacles, became assets. The Malong Spin demonstrated the incorporation of expressive components as well, as players extended their arms beautifully in unison while using their obliques and shoulder girdle with sophisticated spatial orientation. The group's complete synchronization demonstrated both the emotional and cognitive automatization of the dance's themes of pride, resiliency, and sadness.

As a result of neuromuscular adaptation and rhythm-body integration, the dancers' Slide-Step Turns were smoother, with their torsos remaining upright and their spotting consistent. Similarly, stomping scenes from the Heartbreak portion had improved timing, dramatic expression, and stronger lower-limb control—evidence of muscular coordination that matched emotionally charged narrative. Learner diary reflections regularly noted increasing self-awareness in movement choices, a deeper emotional connection to the dance, and developing confidence.

All things considered, the results confirm that Ope Manque Wayi promotes cultural literacy and holistic motor development in a number of areas, including balance, coordination, timing, rhythm, flexibility, and spatial awareness. All three levels of motor learning are naturally scaffolded by the dance's framework. Biomechanically, it requires a synthesis of expressive and technical movement, activating key muscle groups in sync with culturally unique movements. Pedagogically, the dance supports a learner-centered setting where social dynamics, repetition, and introspection enhance development.

A significant biomechanical challenge delineated in the research was the Kumintang Kneel, a movement that necessitated concurrent upper body fluidity and lower limb stability. This motion encompasses a descending transition from an upright position into a kneeling posture while performing a spiraling arm gesture (kumintang)—a synthesis that imposes demands on flexibility, eccentric muscle control, and joint articulation, particularly affecting the knees and hips. Numerous participants exhibited difficulties in sustaining balance and fluidity attributable to restricted hip flexors, insufficient ankle dorsiflexion, and a lack of developed proprioceptive awareness. These observations correspond with biomechanical investigations that underscore the notion that intricate transitions involving floorwork and expressive gestures impose elevated neuromuscular and joint requirements on individuals lacking formal training (Wilson et al., 2007; Laws, 2002).

To prevent an outsider analysis and to maintain cultural truth, it is important that we use Gaddang cultural informants, and learn from local dance bearers. While the current study was choreographed and analyzed by the researcher, future work should have ethnochoreologists, tribal elders or lineage-based dancers co-researching or consulting. Their interpretations will help to authenticate the symbolic interpretations of gestures like the Kumintang Kneel, or Malong Spin, which hold possible unwritten cultural signifiers that may exist beyond its form.

Moreover, although the existing participant group yielded valuable findings, it’s small size (n=16) and age range (17-21) impose limitations. Expanding the particioant pool to include various ages, physical capabilities, and cultural backgrounds would enhance the applicability of the results. For example, the reactions of older adults or those with mobility limitations to these movements might provide additional insights for adaptive movement or elder health initiatives.

The movement and expressive requirements of Ope Manque Wayi indicate a significant potential for movement therapy, especially in regulating psycho-emotional states, retraining balance, and integrating cognitive and motor functions. Rexent research endorses the application of culturally based dance in therapy—Lima et al. (2016) found enhancements in executive function and mood among older adults after traditional dance interventions, while Kiefer & Riley (2020) highlighted the importance of dance in trauma-informed rehabilitation environments.

In Physical Education, incorporating Ope Manque Wayi can support essential motor skills such as balance, sequencing, and bilateral coordination, while also improving emotional intelligence and cultural understanding. It offers a different approach to movement patterns centered on the West and decolonial education by emphasizing embodied learning grounded in Indigenous identity (Lumbera, 1998).

In rehabilitation, choreographic components like the slide-step turn and engaño step can be integrated into neuromuscular retraining programs for individuals healing from lower limb injuries or vestibular disorders. The story-based format may further improve patient motivation and adherence- a key element in therapeutic results.

According to this study, traditional folk dances like Ope Manque Wayi serve as powerful teaching instruments for human movement in addition to serving as symbols of cultural identity. These dances are perfect for inclusion in physical education, performing arts, and movement science programs because they provide an embodied learning experience where emotional depth and movement efficiency develop together.

CONCLUSION

The research on the traditional Gaddang courtship dance, Ope Manque Wayi, shows how closely cultural performance and useful human movement are related. The research offered strong evidence that indigenous dance forms can function as both cultural artifacts and useful frameworks for teaching movement skills, body awareness, and cognitive-motor integration. This was achieved through a mixed-method approach that combined biomechanical analysis with motor learning observations.

The choreographic elements of the dance, which included expressive kneels, rotational spins, and slide-step turns, worked a variety of muscle groups and joint systems and required differing levels of flexibility, balance, coordination, and spatial control. Learners demonstrated significant gains in postural alignment, rhythmic precision, emotional expression, and group synchronization as they moved from the cognitive to the associative and finally to the autonomous stages. These motor learning phases developed naturally inside the dance's framework, demonstrating how cultural choreography can reflect and support modern movement pedagogy ideas.

Important biomechanical results showed that: Turning and transitional steps improved dynamic balance; layered movements like waltz and engaño turns improved sequential and rhythmic control; and expressive and grounded segments like the kumintang kneel and malong spin developed muscular coordination and proprioception.

In addition to requiring technical proficiency, the dance's emotionally charged segments—which ranged from acceptance and unity to longing and betrayal—also encouraged emotional literacy via movement. The learning process was enhanced by this dual requirement, which pushed dancers to pursue embodied performance rather than mechanical repetition.

Ope Manque Wayi is therefore a useful instrument for combining motor behavior, biomechanics, and cultural narrative. It draws attention to how indigenous dance may serve as a comprehensive teaching tool that helps students develop their kinesthetic intelligence, physical literacy, and sense of cultural identification. It is more than just a show; it is a life-changing event where traditional customs are combined with contemporary educational objectives.

The understanding that folk dances are dynamic systems of embodied knowledge is becoming more widely acknowledged because of this study. It challenges upcoming scholars, instructors, and cultural defenders to investigate the ways in which traditional movement might contribute to heritage preservation and physical education in significant and quantifiable ways.

RECOMMENDATIONS

To enhance the academic and cultural credibility of this study, it is highly suggested that upcoming research efforts engage Gaddang cultural specialists, tribal elders, and indigenous dance practitioners in the documentation and examination of Ope Manque Wayi. This partnership will guarantee cultural accuracy and avoid the continuation of solely an outsider's viewpoint, enhancing the research with experiential cultural understanding and symbolic meaning. Involving local stakeholders can encourage community ownership of the research outcomes and aid in ethical safeguarding of Indigenous intangible heritage.

Future research should expand the participant pool to encompass a more varied range of ages, physical capabilities, and sociocultural backgrounds. The emphasis on novice dancers aged 17 to 21, though informative, restricts the broader applicability of the results. Incorporating older adults, those with mobility challenges, and neurodiverse students would enable researchers to assess how well dance adapts to various physical cognitive situations, and investigate its effectiveness in inclusive education and therapy initiatives.

Considering the recognized biomechanical aspects of the dance-- especially actions requiring balance, coordination, and expressive control-- Ope Manque Wayiexhibits significant promise for use in movement therapy and rehabilitation. Future researches are encouraged to create therapy modules that tailor certain parts of the dance for neuromuscular retraining, emotional regulation, or mobility recovery. Simplified adaptations of the Kumintang Kneel and Slide-step Turn could be utilized in physical therapy environment to aid in proprioceptive retraining and regulate joint movement, particularly for individuals recuperating from lower-limb injuries or balance issues.

For educational purposes, it is recommended that physical education and performing arts programs incorporate Ope Manque Wayi into their competency-focused curriculum. This integration must extend beyond performance to encompass the anatomical, biomechanical, and cultural aspects of the dance. This comprehensive method would not just aid in the development of motor skills but also encourage emotional expression, cultural pride, and decolonial education by linking students to indigenous knowledge systems via embodied learning.

Ultimately, it is essential to allocate resources for the safeguarding of traditional dances via organized documentation. Creating well-crafted annotated video, choreographic notes, and reflective teaching guides will guarantee that Ope Manque Wayi stays available for future generations of teachers, therapists, and researchers. Collaborative initiatives involving educators, movement researchers, and indigenous communities should be formalized to maintain this knowledge system. Policies promoting the integration of intangible cultural assets in education and public health ought to be strengthened to acknowledge indigenous dance not only as an art form but also a crucial instrument for comprehensive e human development. as a crucial instrument for comprehensive human development.

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