Reliability Of Knowledge Transfer Training on Applicability of TechnoBody D-Wall: An Observational Study

by

Isha Sharma

Dissertation Submitted to the
Utkal University, Bhubaneswar, Odisha.

In partial fulfillment
of the requirements for the degree of

Master of Physiotherapy

in

SPORTS

Under the guidance of

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Principal, ABSMARI

**Abhinav Bindra Sports Medicine and Research Institute,
Bhubaneshwar**

2021-2023

DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation/thesis entitled "**Reliability of Knowledge Transfer Training on Applicability of TechnoBody D-Wall: An Observational Study"** is a bonafide and genuine research work carried out by me under the guidance of **Dr. Chinmaya Kumar Patra, Principal, Abhinav Bindra Sports Medicine and Research Institute, Bhubaneshwar.**

Date:

Place:

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Isha Sharma

CERTIFICATE BY THE GUIDE

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Date :

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Signature of the Guide

Dr. Chinmaya Kumar Patra (PT)

CERTIFICATE BY THE CO-GUIDE

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Dr. Gayatri Acharya (PT)

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I Isha Sharma of Abhinav Bindra Sports Medicine & Research Institute Odisha, Bhubaneswar hereby declare that the Utkal University, and Abhinav Bindra Sports Medicine & Research Institute Odisha, Bhubaneswar shall have the perpetual rights to preserve, use and disseminate this dissertation / thesis in print or electronic format for academic / research purpose.

Date: **Signature of the Candidate**

Place: **Isha Sharma**

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In conclusion, this dissertation stands as a testament to the collaborative efforts of the individuals mentioned above, and I am deeply grateful for their contributions to my academic success.

Thank you.

Date: **Signature of the Candidate**

Place: **Isha Sharma**

LIST OF ABBREVIATIONS USED

- D-Wall – Digital Wall
- ICC - Intraclass Correlation Coefficient
- MCQ – Multiple Choices Question

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ABSTRACT

Title: Reliability of Knowledge Transfer Training on Applicability of TechnoBody D-Wall: An Observational Study

Background & Objectives: In recent years, knowledge transfer training has gained prominence as an effective method to facilitate the transfer of expertise and skills from one context to another. TechnoBody D-Wall represents an innovative technology used for various physical training and rehabilitation purposes. This study aims to investigate the extent to which knowledge transfer training influences the proficiency and adaptability of users when engaging with the TechnoBody D-Wall.

Methods: Participants were selected based on specific criteria, including trainers, paper setters, moderators, evaluators, and learners. Trainers instructed students, paper setters set the pre- and post-D-Wall questionnaires, moderators compiled final question sets, and learners took a pre-D-Wall exam. Training covered D-Wall aspects in two stages: trainer to primary learner (1:2) and primary to secondary learner (1:3, selected by lottery). A post-training subject test was conducted with a 1:1 ratio. SPSS software (version 29) was utilized for analysing subject test outcomes.

Results: Interrater agreement is excellent among all raters, reflected by an overall ICC of 0.980 (95% CI). Additionally, excellent agreement is observed among trainer-primary learner (ICC 0.822), primary-secondary learner (ICC 0.856), and trainer-secondary learner (ICC 0.869) pairs.

Conclusion: In summary, this study confirms the effectiveness of knowledge transfer training in improving TechnoBody D-Wall's applicability, enhancing user competence and ease of use. Structured training programs are highlighted as crucial for successful technology integration.

Keywords: Knowledge transfer; TechnoBody D-Wall; Interventional Training; Skill Transfer; Technology Integration.

INTRODUCTION

The process of exchanging and employing research findings produced in academics in practise is known as "knowledge transfer" (KT).(1) It is the procedure by which information, concepts, and experience are transferred from the knowledge source to the knowledge recipient.(2)

Knowledge transfer, according to Davenport and Prusak (1999), entails two actions: transmission (the sending or presentation of knowledge to a possible recipient) and absorption by an individual or a group.(3) According to Christense's definition from 2003, "Knowledge transfer" is the process of locating (accessible) knowledge that already exists, acquiring it, and then using it to create new ideas or improve the existing ones in order to speed up, improve, or make a process or action safer than it otherwise would have been. Therefore, knowledge transfer essentially involves not just utilising readily available resources, such as knowledge, but also effectively acquiring and assimilating that knowledge in order to improve processes and outcomes(4) Van den Hooff and de Ridder (2004) assert that knowledge transmission encompasses either actively imparting what one knows to others or actively seeking out the knowledge of others(5) Focused, one-way knowledge transfer between people, groups, or organisations that enables the recipient to:

(a) comprehend the information conceptually,

(b) utilise it effectively, or

(c) uses the information(2)

The healthcare system and patient care have a great deal of room for improvement because of advances in technology, particularly cognitive agents

and robots. Healthcare practise and academics are still at different levels of digitization, and there is currently insufficient information about how healthcare facilities can successfully acquire, apply, and adopt new knowledge and technology.(1)

One of such healthcare technology is TechnoBody Digital wall, which symbolises the mirror revolution. The technological instrument that is marketed is called a "D-wall." It is a high-tech digital mirror that not only enables you to control each motor motion to the fullest extent but also allows you to analyse the performance in real-time using a set of exact metrics. (6)

It recognises every movement made in the operating area in real time and up to 16 body articulations by virtue to its 3D camera and force/strength platform. To develop a training manual for both rehabilitation and physical fitness, assessment and training can be controlled in concert. By virtually viewing the screen, it offers instant biofeedback that enables the user to modify their biomechanics or movement. A few D-wall characteristics are:

1. The platform with sensored force

2. A 3D camera

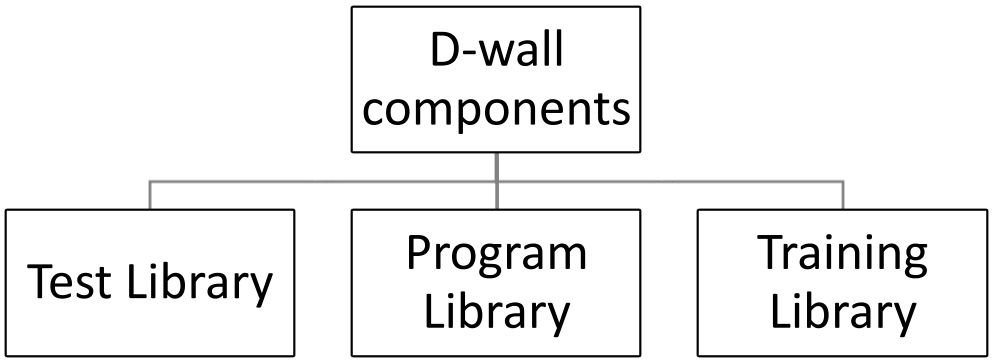
3. Video display

4. Touch screen monitor 16"

5. TechnoBody key

6. The Polar software suite

It has a couple of its elements can be used for both assessment and rehabilitation. (6)



Test library	Quick Test	Program Library	Rehab
	Jump analysis		Health
	Static stability limits		Sport
	Dynamic stability limits		

Training Program	Balance
	Endurance
	Strength
	Agility
	Occupation
	Functional
	Mobility
	Virtual Reality

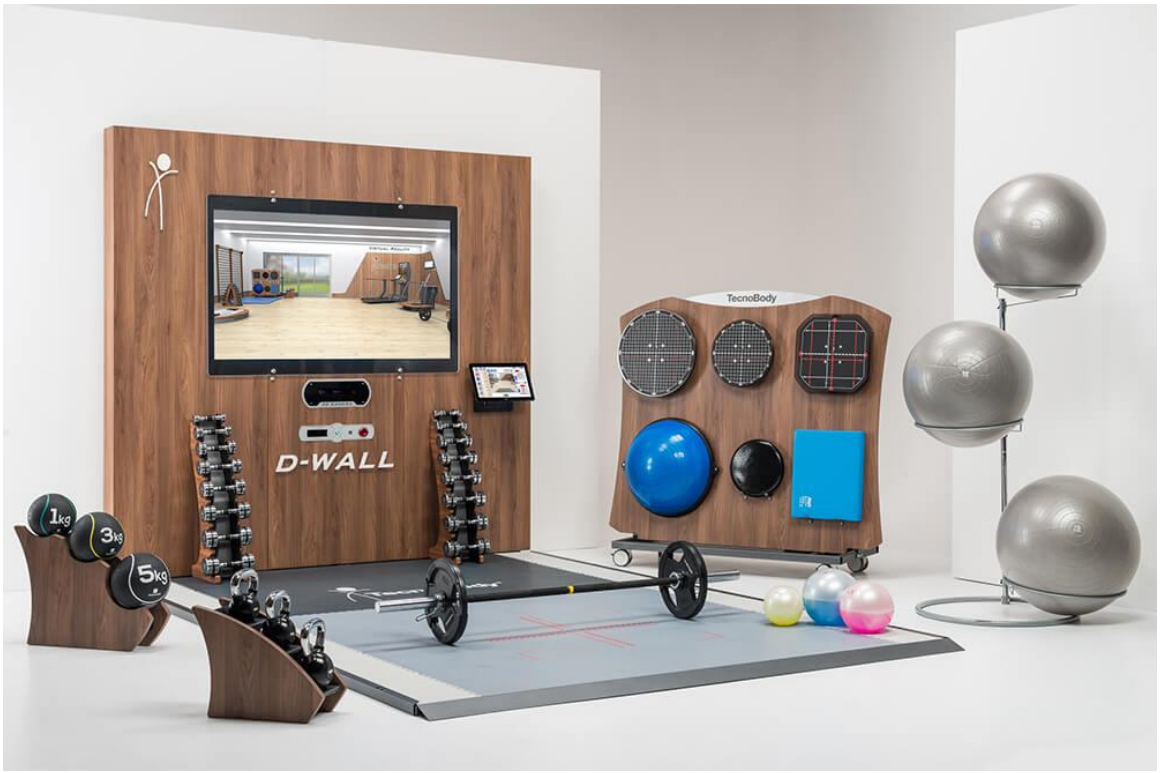


Figure 1 : TechnoBody D-Wall

Sports, cardiovascular exercise, occupational therapy for seniors, and children's motivation are some applications for D-wall. It comes with a variety of accessories, including functional and active balancing kits. The Active Bipodal Platform, Active Monopodial Platform, Monoaxial Active Platform, Balance Pad, Balance Disc, and Bosu are all included in the Active Balance Kit. Combining weights, barbells, kettlebells, fit balls, and medicine balls makes up a functional kit. (6)

However, because of the complexity of technology, the technology readiness level of the produced systems is particularly low, despite the fact that the cutting-edge technologies developed have significant potential for application in the social healthcare area. However, there is a particularly high demand for

healthcare technology, support systems, and partnerships between academia and the healthcare industry. To get the highest healthcare outcomes possible, high-value clinical methods, technology, and organisational models must be quickly adopted.(1) Despite the fact that D-wall is a commercially available tool, in-depth operating knowledge is still required. Therefore, this study will focus on the present KT to determine whether it is sufficient for the goal.

This study focuses on technical knowledge transfer, which is the "process of communicating results from scientific and technological research to the recipient and is as such a crucial part of the technological innovation process". KT between research institutions and clinical settings has many benefits, including improved surgical outcomes, therapeutic procedures, and patient care (e.g., individualised care).(7) The purpose of the study is to determine the reliability of knowledge transfer training with regard to the applicability of various D-wall determinants.

OBJECTIVES

1. To find out consistency or significance of difference between the trainer and the primary learner.
2. To find out consistency or significance of difference between the primary learner and the secondary learner.
3. To find out consistency or significance of difference between the trainer and the secondary learner.

HYPOTHESIS

- **Null Hypothesis**

  There is no consistency between the data obtained by the trainer, primary learner and secondary learner.

- **Alternate Hypothesis**

  There is consistency between the data obtained by the trainer, primary learner and secondary learner.

METHODOLOGY

- **Study setting** - Care Hospital, Bhubaneshwar.
- **Sample Size** – Trainer: Learner ratio

  1:8
- **Inclusion criteria**

  Trainer – 4-5 years clinical experience and at-least 1 year experience of using D-wall

  Learner – basic level of education in field of physiotherapy

  - students with bachelor's degree

  - students having more than 50% in MCQ exam conducted to be included in the study

  Paper setter - 4-5 years clinical experience and 1 year experience of using D-wall

  Subject – recreational athlete who can practice more than 5days/week
- **Exclusion criteria**

  - not willing to participate

  - students who did not pass the exam with 50% cut-off.

PROCEDURE

- Based on the inclusion and exclusion criteria, the trainer, paper setter, moderator, evaluator, and learner were chosen.
- The trainers were approached to provide instruction to the students and the paper setters for the pre- and post-D-Wall questionnaires.
- Pre- and post-test evaluation required a total of 12 questions from each paper setter, divided into 2 sets of six questions each.
- The moderator received all of the submitted questions and compiled two sets of final questions, each with ten questions, to be used for pre- and post-training evaluation.
- Eight chosen students took the pre-D-Wall training exam to gauge their level of familiarity with the technology.
- The examiner assessed each answer sheet for pre-training scores.
- Training on D-Wall was conducted after the exam and covered all aspects of D-Wall (evaluation, rehab planning, etc.)
- The training took place in two stages:

  - Trainer to primary learner (1:2)

  - Primary learner to secondary learner (1:3)

  (Both Primary and Secondary learner were selected by lottery method)

- After the training period was completed the trainer and the learner performed the test on an athletic subject with a ratio of 1:1
- A post-D-wall training exam was conducted.
- The evaluator assessed each answer sheet to determine the post-training results.

- SPSS software was used to analyse all the results, including those from the pre- and post-D-wall examination and the test results for the athletic subject.

Figure 2: Pre-test evaluation

Figure 3: Training session

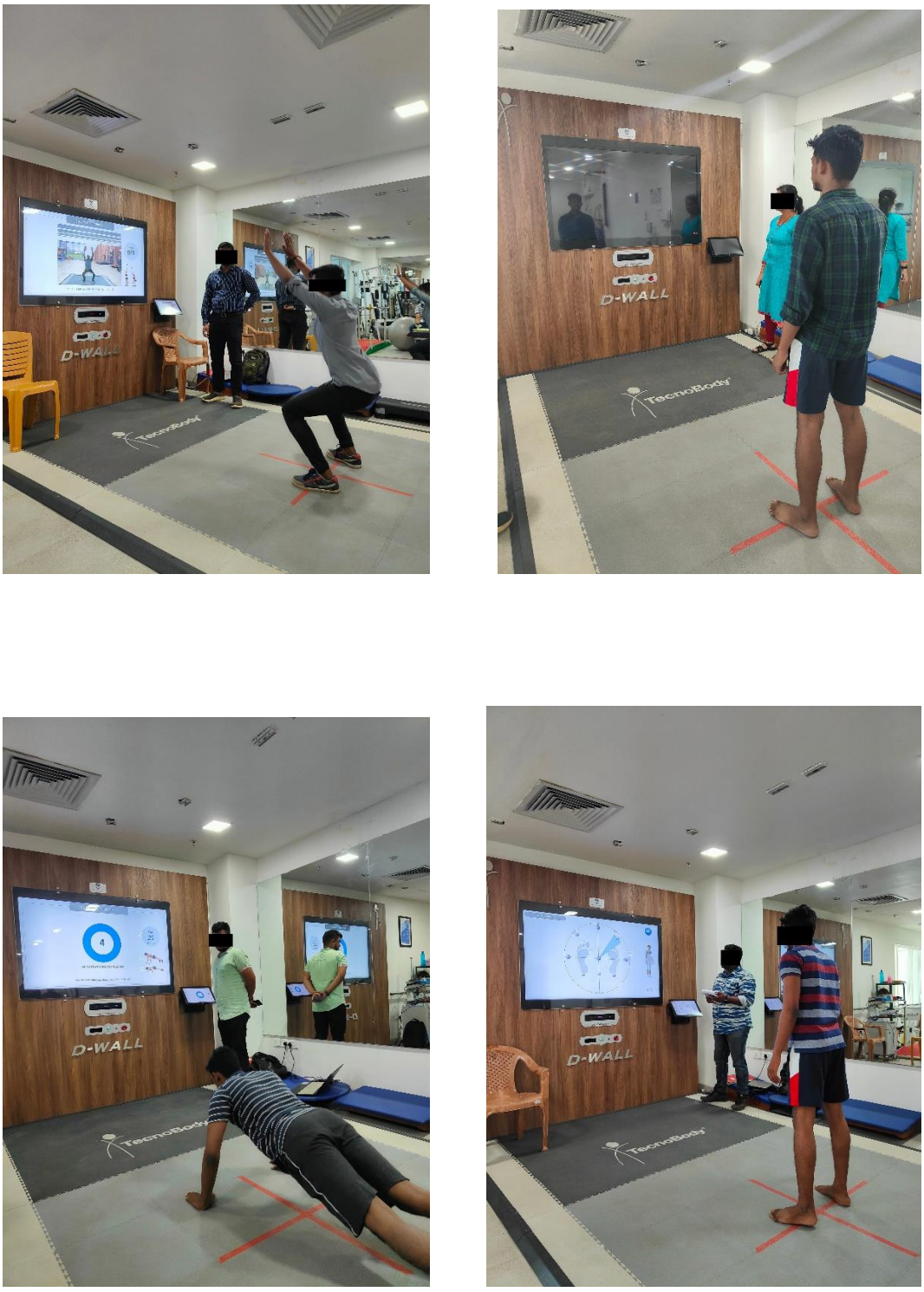


Figure 4: Post training assessment

SAMPLE SIZE

ESTIMATION

The sample size or student-to-teacher ratio was chosen in accordance with other research on knowledge transfer in the healthcare industry.(8–10)

The total participants were 8 learner and 1 trainer.

STATISTICAL ANALYSIS

To determine the interrater reliability between the trainer and learner's, the intraclass correlation coefficient (ICC) was calculated. The ICC is a standard tool to determine the interrater reliability of more than two raters.

The data was calculated by using IBM SPSS Statistics for windows Version 29.0. To compare the overall mean ratings from all the raters, ICC estimates and their 95% confidence intervals were calculated based on a mean-rating, consistency, two-way mixed model (ICC 3,K).

ICC estimates with their 95% confidence intervals were calculated, one between trainer and primary learner, second between primary learner and secondary learner, and third between trainer and secondary learner based on single rating, consistency, two-way mixed model (ICC 3,K).

The ICC estimates were interpreted using the guidelines suggested by Koo. The ICC estimates are categorized in poor, fair, good, and excellent interrater agreement.(11)

RESULTS

The ICC estimates of overall mean rating of all the raters is 0.980 (95% confidence interval, CI). This signifies an excellent interrater agreement between all the group of raters. The ICC estimate between the trainer and primary learner is 0.822 (95% confidence interval, CI), between the primary learner and the secondary learner is 0.856 (95% confidence interval, CI), between the trainer and secondary learner is 0.869 (95% confidence interval, CI). This signifies an excellent interrater agreement between the three group of raters.

Table 1: ICC value within groups

RATERS	ICC VALUE
Overall Mean Rating	0.980
Trainer And Primary Learner	0.822
Primary And Secondary Learner	0.856
Trainer And Secondary Learner	0.869

DISCUSSION

Human civilization is advancing as a result of the growth of technical innovation across various domains including Health.(12) The Current study aimed to determine the reliability of knowledge transfer training with regard to the applicability of various D-wall determinants. Research done by Michel Wensing et.al concluded that Knowledge transfer and healthcare improvement in healthcare needs research centres or networks that bring together scientists with different backgrounds who can work on sequential projects over a longer period of time. Research on improving healthcare and knowledge implementation requires a higher appreciation of the field in the academic and health community, and alignment of resources and power in institutions accordingly.(7) Research indicates that poor handover is associated with multiple potential hazards such as lack of availability of required equipment for patients, information omissions, diagnosis errors, treatment errors, disposition errors and treatment delays.(13) our review indicates that the principal teaching methods are role-playing and simulation, which may result in better knowledge transfer to the work environment, better health and patients well-being.(7) This study done by Melissa Desmedt emphasize on a combination of lectures, simulation-based workshops, and case-based discussions, with a move towards more competency-based training.(13) Because of technological advancements, particularly those involving cognitive agents and robots, the healthcare system and patient care still have a significant deal of space for improvement. Between academics and healthcare practise, there is still a digitalization divide, and there is limited information about how healthcare facilities may successfully acquire, apply, and adapt new knowledge and technology.(1)

One of the modern technology is TechnoBody D-Wall which represents a transformative technology with immense potential in the healthcare sector. As an interactive virtual reality training system, it offers a range of applications that can significantly benefit both patients and healthcare professionals. From physical rehabilitation and neurological therapy to pain management and psychological treatment, TechnoBody D-Wall's immersive experiences hold promise in enhancing patient outcomes and promoting overall well-being.(6)

Additionally, its utility as a medical training tool, recreating scenarios and procedures for professionals, can improve their skills and performance. However, while the benefits are evident, challenges related to cost, training, and patient safety need to be carefully addressed. Despite these hurdles, the integration of TechnoBody D-Wall in healthcare presents an exciting avenue for advancing medical practices and elevating the quality of patient care.

Because of the complexity of technology, the technology readiness level of the produced systems is particularly low, despite the fact that the cutting-edge technologies developed have significant potential for application in the healthcare area the applicability still remains a question. Studies in related fields have consistently demonstrated that effective knowledge transfer significantly enhances the application of novel technologies and techniques.

Hence In this observational study, we investigated the reliability of knowledge transfer training and its impact on the applicability of TechnoBody D-Wall. Our research tried to shed light on the effectiveness of knowledge transfer in promoting the practical use of this innovative technology in various settings.

Furthermore, our study results show that knowledge transfer on a ratio of 1:2, 1:3 and 1:8 is highly significant also this study contributes to the growing body of evidence supporting the value of knowledge transfer programs in technology integration in health care.

CONCLUSION

In conclusion, this observational study supports that knowledge transfer training is a reliable approach to enhance the applicability of TechnoBody D-Wall. Participants who received the training demonstrated improved competence and ease of use with the technology. These findings underscore the importance of structured training programs in encouraging the implementation and integration of technology smoothly and successfully.

CLINICAL IMPLICATION

The findings highlight the positive impact of knowledge transfer training in enhancing the applicability of TechnoBody D-Wall technology. Incorporating such training into patient rehabilitation programs can lead to improved outcomes, as personalized exercises can be designed to target specific needs. This, in turn, empowers patients to actively participate in their recovery journey. Moreover, healthcare professionals can benefit from structured training programs, improving their competence in using TechnoBody D-Wall to deliver high-quality care. The study's results also justify the investment in the technology, as it may lead to cost savings through improved patient outcomes and potentially reduced hospital readmissions. Furthermore, the research paves the way for the integration of virtual reality technology in other healthcare settings, such as psychological therapy and medical education. Overall, the study highlights the potential of knowledge transfer in driving innovation, improving patient-centric care, and advancing healthcare practices through the effective integration of TechnoBody D-Wall.

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ANNEXURE 1

Trainer Consent

Respected Sir,

I, Isha Sharma, a 2nd year MPT student of ABSMARI would like to express my gratitude that you have been appointed as a trainer for my research project entitled "RELIABILITY OF KNOWLEDGE TRANSFER TRAINING ON APPLICABILITY OF TECHNOBODY D-WALL: AN OBSERVATIONAL STUDY".

I believe that your expertise in this area would have a great impact on this study. Before you begin the training for our study, we need you to read and sign this consent form to ensure that you fully understand the nature of the study and your role in it.

Researcher(s): Isha Sharma (MPT Scholar, ABSMARI), Primary Investigator.
Dr. Chinmaya Kumar Patra (Principal, ABSMARI), Guide.

Purpose of the Study: The purpose of this study is to check the reliability of knowledge transfer training

Your Role in the Study: Your role in this study is to train the students regarding D-Wall.

Risks and Benefits: There are no significant risks associated with your involvement in this study. However, your participation in this study may benefit the research community by helping to further understand the D-WALL.

Confidentiality: As the study is blinded any information that you provide during the course of this study will be kept strictly confidential. Your personal information will not be disclosed to any third party without your written consent.

Voluntary Participation: Your participation in this study is entirely voluntary. You have the right to refuse participation or withdraw from the study at any time without consequence.

Contact Information: If you have any questions or concerns about the study, you can contact Isha Sharma contact no. +918770909075.

Consent: By signing this form, you acknowledge that you have read and understand the above information and voluntarily consent to participate in this research project.

Acceptance: I confirm that Ms. Isha Sharma (Investigator) has explained to me the purpose of the study and the procedure. Therefore, I agree to give my assent for participation as a paper setter in this study and I will be accountable for the decisions.

Signature: _____ Date: _____

ANNEXURE 2

Learner Consent

INFORMED CONSENT FORM

I have been informed by Ms. Isha Sharma; pursuing MPT (Sports) conducting scientific research guided by Dr. Chinmaya Kumar Patra, Principal, Department of Physiotherapy, ABHINAV BINDRA SPORTS MEDICINE AND RESEARCH INSTITUTE (ABSMARI), BHUBANESWAR.

I have no objection to be a learner. I understand that the information produced by the study will become a part of the institute's record and will be utilized as per the institute's confidentiality regulations. I am also aware that the data might be used for medical literature and teaching purposes, but all my personal details will be kept confidential.

I wish to discuss my participation and concerns regarding this study with a person not directly involved. I understand that my assent is voluntary and I reserve the right to withdraw or discontinue participation in the study at any point of time during the research.

I have explained to Mr/Miss/Mrs _____
the purpose of the research, and the procedure required in the language he/she could understand to the best of my ability.

(Investigator) (Date)

I confirm that Ms. Isha Sharma (Investigator) has explained to me in the language I can understand, the purpose of the study and the procedure. Therefore, I agree to give my assent for participation as a learner in this study and I will be accountable for the decisions.

(Signature)
(Date)

(Place)

ANNEXURE 3

Subject Consent

INFORMED CONSENT FORM

I have been informed by Ms. Isha Sharma; pursuing MPT (Sports) conducting scientific research guided by Dr. Chinmaya Kumar Patra, Principal, Department of Physiotherapy, ABHINAV BINDRA SPORTS MEDICINE AND RESEARCH INSTITUTE (ABSMARI), BHUBANESWAR.

I have no objection and will be a part of the study. I also understand that the study does not negatively affect my health. I understand that the information produced by the study will become a part of the institute's record and will be utilized as per the institute's confidentiality regulations. I am also aware that the data might be used for medical literature and teaching purposes, but all my personal details will be kept confidential.

I am well informed to ask as many questions as I can to Ms. Isha Sharma during the study or later. I wish to discuss my participation and concerns regarding this study with a person not directly involved.

I understand that my assent is voluntary and I reserve the right to withdraw or discontinue participation in the study at any point of time during the study.

I have explained to Mr/Miss/Mrs _____ the purpose of the research, and the procedure required in the language he/she could understand to the best of my ability.

(Investigator) (Date)

I confirm that Ms. Isha Sharma (Investigator) has explained to me in the language I can understand, the purpose of the study and the procedure. Therefore, I agree to give my assent for participation as a subject in this study and I will be accountable for the decisions.

(Signature) (Date)

(Place)

MASTER CHART

Sr No.	QT INDEX	JUMP HEIGHT [m]	FLIGHT TIME [s]	AGILITY	Ellipse area [mm^2] B/L	LOS SWAY	Ellipse area [mm^2] RIGHT FOOT	Ellipse area [mm^2] LEFT FOOT	Ellipse area [mm^2] OPEN EYES	Ellipse area [mm^2] CLOSE EYES	REACTION TIME UL	REACTION TIME LL
1	49	0.26	0.36	21	89.76	99.44%	1072.57	818.92	162.59	113.55	0.68	1.1
2	52	0.26	0.38	27	328.3	96.32%	858.07	1239.58	195.76	227.22	0.65	1.11
3	63	0.26	0.39	56	159.35	97.95%	496.68	527.53	108.11	71.56	0.63	1.01
3a	58	0.28	0.4	54	105.45	97.39%	847.74	640.8	114.77	141.63	0.63	0.96
3b	50	0.27	0.39	36	68.15	99.80%	780.77	667.04	68.87	69.77	0.62	0.9
2a	54	0.25	0.38	50	111.77	97.10%	654.19	747.8	275.59	105.22	0.64	0.85
2b	57	0.21	0.32	52	141.15	98.49%	585.82	1352.85	99.43	62.28	0.62	0.83
3c	58	0.26	0.36	67	155.66	97.63%	797.7	635.3	224.78	138.73	0.6	0.79
2c	55	0.3	0.4	68	150.01	95.84%	1030.88	1089.79	136.91	81.1	0.6	0.76