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THE EFFECT OF THE BYBEE MODEL ON LEARNING THE EFFECTIVENESS OF PUSHING WEIGHTS FOR FIRST-YEAR STUDENTS IN THE COLLEGE OF BASIC EDUCATION

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Abstract
The research aims to prepare exercises using the Bybee model in teaching the effectiveness of weight pushing to first-stage students, as well as identifying the effect of using the Bybee model in learning the effectiveness of weight pushing for members of the research sample.
To achieve the goal, the researcher used the experimental method and designed two equal experimental and control groups with a pre- and post-test to suit it with the problem and objectives of the research. The research community was limited to the students of the first stage of morning study in the Department of Physical Education and Sports Sciences - College of Basic Education - Al-Mustansiriya University, for the academic year 2023-2024, and their number is (115) students distributed into (6) classes (A - B - C - D - E - F). The research population was determined by the students of the first stage because this stage studies the effectiveness of pushing the weight. As for the research sample, they were chosen by lottery among the classes to determine the groups. (Experimental and control) Then the researcher selected (25) students from each section by lottery as follows: Section B (25) students, Section E (25) students, their total number reached (50) students, with a percentage of (43.47%), which was divided into two groups, control and experimental, as the experimental group, which is Section (B), will learn the effectiveness of pushing the weight according to the model Bybee and the control group, which is Division (H), learned in the manner followed by the teacher (the imperative method) and according to the curriculum of the scheduled physical education lesson. The researcher conducted the pre- and post-tests for the experimental and control groups, and the appropriate statistical treatments were conducted. The researcher concluded that using the Bybee learning model had an effective impact on learning the effectiveness of weight pushing among the research sample, and that the thrill, excitement, and competition that existed as a result of using the Bybee model increased the students' motivation to perform and also facilitated the process of learning the effectiveness of weight pushing.
The researcher recommends the necessity of adopting the Bybee learning model in teaching the effectiveness of weight pushing, and using the Bybee learning model because it facilitates the process of applying and achieving the educational goals set for the teacher, as well as conducting a study similar to the current study on other sports skills and at different age and educational stages.
Keywords: Bybee model, weight-pushing effectiveness, Constructivist theory.

1. Introduction to the Research:

1.1 Introduction and Importance of the Research:

The learning process is one of the fields that has undergone significant scientific advancements due to its potential role in building society and solving its problems. The modern concept of the learning process has shifted focus towards transitioning the educational process from the teacher to the learner. In this approach, the teacher's role becomes that of a guide and mentor, directing the activities of the students to enable them to

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rely on themselves, thus facilitating the learning process and making an active and vital participation, which affects the performance levels.

Learning models play an essential role in acquiring and developing skills. The technical performance level of any sports skill is related to how that skill is learned and also to the learners' level. The learning process has seen extensive and significant developments through the use of various models, which can significantly impact the learner's skill level. Many studies and research have sought to find effective methods, theories, and models for the learning process. One of these theories is the constructivist theory, which includes several learning models that contribute to making learning an active process, such as the Bybee model.

The learning cycle, which is the first step of the constructivist theory, was initially conceptualized by Atkin and Karplus in 1962, based on some constructivist ideas derived from Piaget's cognitive development theory. However, the Bybee model aims to enable students to build their scientific knowledge of the skill themselves. It also aims to develop many concepts and skills, consisting of five stages: engagement, exploration, explanation, elaboration, and evaluation.

The Pushing the weight event is one of the activities in the first-year curriculum for students of the College of Physical Education and Sports Sciences. Therefore, the importance of this research lies in using a new model, which the researcher believes can achieve the desired objectives of reaching the best level for learners in learning sports skills in general and pushing the weight specifically. This is achieved by teaching and developing basic skills using the best and most effective learning and teaching models.

Hence, the importance of this study is that it attempts to direct the attention of specialists to the importance of teaching the Pushing the weight event according to the Bybee model. This model contributes to teaching motor skills and increasing their cognitive aspect by fostering thinking and exploration among learners. Moreover, this model is considered one of the active models that may captivate students' interest, motivate them to learn, and encourage their active participation with the teacher.

1.2 Research Problem:

The educational process is greatly influenced by the methods of learning and teaching. Since the teacher plays a leading role in the educational process, it is essential for them to have a comprehensive understanding of how to design appropriate educational programs and ways to develop them, as well as to make proper choices of models or methods that align with the learners' abilities to achieve the best results. Through a general perspective on the nature of delivering physical education lessons, as well as interviews conducted by the researcher with subject instructors, the problem was identified as follows:

- Most instructors still rely on the American style. While this is not inherently wrong, there is a noticeable weakness in student performance, leading to the following question:
- Can the use of the Bybee model yield positive results in learning the pushing weight event?

3. Research Objectives:

- Prepare exercises using the Bybee model to teach Pushing the weight event to first-year students.
- Identify the impact of using the Bybee model on learning Pushing the weight event for the research sample individuals.

1.4 Research Hypothesis:

- There are statistically significant differences between the pre-test and post-test results for the Pushing the weight event among the research sample.

1.5 Research Scope:

1.5.1 Human Scope:

- First-year students from the College of Physical Education and Sports Sciences, College of Basic Education.

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1.5.2 Temporal Scope:

- From February 1, 2024, to May 16, 2024.

1.5.3 Spatial Scope:

- The athletics field of the College of Basic Education, Department of Physical Education and Sports Sciences.

3. Research Methodology and Field Procedures:

1 Research Methodology:

The researcher used the experimental method with pre-test and post-test to suit the research problem.

3-2 Research community and sample:

The research community was determined by the students of the first stage of morning studies in the Department of Physical Education and Sports Sciences - College of Basic Education - Al-Mustansiriya University, for the academic year 2023 - 2024, numbering (115) students distributed over (6) sections, namely (A - B - C - D - E - F). The research community was determined by the students of the first stage, as this stage studies the effectiveness of weight pushing. As for the research sample, they were chosen by lottery between the sections to determine the groups (experimental and control). Then the researcher identified (25) students from each section by lottery as follows: Section B (25) students, Section H (25) students, and their total number was (50) students, with a percentage of (43.47%), as they were divided into two groups, control and experimental, as the experimental group, which is Section (B), will learn the effectiveness of weight pushing according to the Bybee model, and the control group, which is Section (H) I learned in the method followed by the teacher (the imperative method) and according to the curriculum of the prescribed physical education lesson.

3-3 Means of collecting information and devices and tools used in the research:

3.3 Data Collection Methods:

- Arabic and foreign references and sources.
- Personal interviews.
- Expert and specialist opinion survey forms regarding grading.
- Data extraction forms.
- The Internet.
- Tests and measurements.
- Pilot study.

3.3.2 Instruments and Tools Used in the Research:

- Three digital electronic stopwatches (Casio).
- One laptop (Lenovo).
- Athletics field.
- Ten iron balls.
- Japanese-made whistle.
- CDs.
- Twenty markers.

3.4 Field Research Procedures:

3.4.1 Test Used in the Research:

Motor Skill Test (Technical Performance Level – weight lifting)

- **Purpose of the Test:** Measure the technical performance level.
- **Instruments Used:** Measuring tape, stop board, video camera (210 frames per second).

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- **Performance Description:** The participant stands in the throwing circle (2.135 meters in diameter) with their back facing the throwing sector. They then coil and glide backward, transitioning to the throwing position, followed by the throw, release, and balance after propelling the shot put forward for the longest possible distance. The performance is also recorded using a video camera to be reviewed by experts for grading the technical performance.
- **Test Instructions:**
  - Do not touch the ground outside the circle or cross the stop board.
  - Ensure the weight pushing falls within the throwing sector, which has an angle of 32.94°.
  - Each participant has three attempts, with the best one being recorded.
- **Scoring:** The distance is measured from the inner edge of the iron frame or the stop board, with the tape passing through the center of the circle to the nearest mark left by the shot put. This distance represents the digital performance level.
- **Considerations by the Researcher During Test Application:**
  - Ensure all external conditions and testing environments for pre-tests and post-tests are consistent.
  - Account for individual differences among the sample members and create a conducive psychological environment through explanation and clarification.

3.4.1.1 Preparation of the Technical Performance Evaluation Form:

A form for evaluating the technical performance level was prepared according to experts' opinions, detailing the score for each stage of the shot-put movement as shown in Appendix (5). The form includes the following stages:

1. Preparation Stage
2. Glide Stage
3. Power Position
4. Delivery Phase
5. Follow-through and Balance

The scores for the technical performance were assigned based on the four stages mentioned above, reflecting their significance as determined by expert opinions. The maximum score for the evaluation is 100 points for the complete performance of the event. The technical performance was assessed by instructors with specialization and experience in track and field events. They evaluated the performance by watching slow-motion and regular video recordings of the technical performance of the participants in both groups. The arithmetic means of the total scores from the evaluators were then calculated.

Summary of the Scoring:

Coiling Stage: 15 points

Gliding Stage: 25 points

Positioning and Throwing Stage: 50 points

Stabilization and Balance Stage: 10 points

The evaluation was conducted to ensure a comprehensive assessment of the shot-put technique, with experts carefully analyzing each component of the performance. The scores from these evaluations were then averaged to determine the final performance scores for each participant.

-4-2 Exploratory experiments:

3-4-2-1-1 The first exploratory experiment

The researcher conducted the first exploratory experiment for the test on a sample of the exploratory experiment sample for first-stage students, numbering (6) students, on (Sunday) (4/2/2024) at exactly (ten

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o'clock in the morning), and on the athletics field in the College of Basic Education, Al-Mustansiriya University, in the Department of Physical Education and Sports Sciences, and the goal of the experiment was achieved, which is:

• The time period required to perform the test.
• The validity of the tools used in the research.
• Diagnosing errors and obstacles that will appear in the exploratory experiment and overcoming them.

3-4-2-1-2 The second exploratory experiment for the educational units prepared for the Bybee model The researcher conducted the second exploratory experiment for the educational units according to the Bybee model on a sample of first-stage students for the academic year (2023-2024) on Tuesday, corresponding to 6/2/2024 at (ten in the morning) to determine the suitability of the model for the students, in addition to organizing the time limit for the educational units, in light of which the time of activities in the other units will be calculated approximately and to determine the suitability of the time allocated to the preparatory, main and final lesson parts.

3-4-3 Pre-tests:

The researcher conducted the pre-test of the weight-pushing activity on the research sample on Thursday, February 8, 2024, at the athletics stadium, after explaining the instructions and necessary steps on how to perform and apply, as well as preparing all the requirements and supplies for the tests.

3-4-3-1 Equivalence of the two research groups:

The researcher conducted equivalence for the two research groups (experimental and control) in the variables related to the research and before starting to implement the educational units on the main research sample. The researcher found that the individuals of the two groups (experimental and control) were equal, and this is a good indicator that these two groups are equal in the research variables. Thus, it became clear that these two groups are equal to conduct the study, which indicates that there are no significant differences between the two groups, which confirms the equivalence of the two groups in all pre-tests, as shown in Table (1).

Table (1)
Shows the equivalence of the research groups in the pre-test.

indication	Sig	T value	Experimental		Standers		The test
			R	S	R	S	
Significant	0.341	0.962	5.19	33.72	7.91	31.87	**Weight throwing performance**
Significant	0.076	0.675	1.05	8.65	1.25	8.70	**Weight Throwing Achievement**
*it becomes different on the level (0.05) and Freedom(48)							

4-4 Main experiment:

The main experiment was conducted starting from Sunday (11/2/2024) until (3/4/2024) in the (second) semester for (8) weeks at a rate of (2) educational units per week, so the total number of units will be (16) units, for (45) minutes.

The time of the educational unit was divided as follows: -

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Preparatory section / 7 minutes
Main section / 35 minutes
Final section / 3 minutes
The researcher implemented the educational units on the research sample by the subject teacher and under the direct supervision of the researcher, and the designed units were applied using the BYPE model to the experimental group.
Number of educational units: (16) for each system
Duration of the educational unit: 45 minutes
Number of weekly units: Two educational units for each educational group

3-4-5 Educational curriculum

4-5-1 The educational method for the experimental group: The researcher adopted the Bybee model, as the researcher prepared educational units in light of the curriculum prescribed for the experimental group. The Bybee model consists of five stages, in which the student also has an important role in the success of the learning process. After warming up in the preparatory part, the teacher enters the main section with its educational part. The first stage of this model is (the preoccupation stage). In this stage, the teacher must make the students busy with the learning task by focusing mentally. The teacher must attract their attention and arouse the students' motivation to participate in thinking about the topic of the lesson. The teacher begins a dialogue with his students about the new skill to be learned and linking it to the previous experiences that the students have that are related to the new skill, and providing some information and questions about the theoretical aspect of the new skill. Here the first stage ends and the second stage begins, which is the (exploration) stage. The students are divided into groups, and each group discusses with each other to reach a discovery of everything that is ambiguous about the new skill to be learned without the help of the teacher, as through research and group discussions the student searches for answers to the questions The third stage of the Bybee model is the (interpretation) stage. This stage aims to make the teacher confront the learner's thinking so that they find solutions in a cooperative manner. In it, the learner is encouraged to explain what they have reached and the learners are asked to explain and discuss each answer using their previous experiences as a basis for interpretation. The experiences are linked with the two previous stages (engagement and discovery) by presenting and clarifying concepts and skills and making their use common to all. As for the teacher's role, it is to explain each stage of the technical performance of the new skill so that he explains to the students how to perform correctly and common mistakes and the reasons for those mistakes so that they reach the correct concept for performing this skill. Here we enter the applied part of the educational unit, which is the fourth stage of the Bybee model, which is (the expansion stage). In this stage, students use the explanations that were developed and reached in the previous stage by benefiting from them in performing the applied exercises. In this stage, students begin to apply the performance actually after they have completed their understanding of the skill through the three previous stages, reaching the last stage, which is (the evaluation stage). Performance is evaluated by the teacher to reach the correct ideal form of learning the skill. Students receive immediate (during the exercise) or delayed (after the exercise) feedback. Evaluation is continuous and integrated (and evaluation can be done at all stages of the Bybee model).

4- 6 Post-tests:

After completing the application of the educational units for the experimental group and the control group, the researcher conducted the post-test, on Sunday (4/7/2024) for the experimental and control groups to measure the extent of students' learning of the effectiveness of pushing the weight, using the same test that

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was used in the pre-test and under the same conditions and under the supervision of the researcher and the assistant work team.

3-6 Statistical methods

The researchers used the following statistical systems:

- The (Microsoft Excel) system to download the data, separate it and extract the standard scores in a sequential manner.
- The ready statistical package (IBM.SPSS. Ver20) to obtain the following:
- The arithmetic mean.
- The standard deviation.
- The skewness coefficient.
- The (T) test for equal, non-symmetrical samples.
- The (T) test for equal, symmetrical samples.

4- Presentation, analysis and discussion of the results: 4-1 Presentation, analysis and discussion of the results of the research tests for the experimental and control groups for the effectiveness of weight pushing:

Table (2)

Shows the arithmetic means, standard deviations, and t-values for the pre-test and post-test of the experimental group.

Significance	Sig	T value	Post-Test		Pre-Test		Test
			R	S	R	S	
Significant	0.00	5.825	2.17	50.71	5.19	33.72	**Performance of Shot Put**
Significant	0.00	6.455	0.34	11.45	1.05	8.65	**Achievement in Shot Put**
Significant at the 0.05 level with 24 degrees of freedom *							

From Table (2), it is evident that there are significant differences between the pre-test and post-test results in favor of the post-test for the experimental group in the research tests. The researcher attributes these differences to the exercises used in the educational units and the approach of the Bybee model, which consists of five stages: (Engagement, Exploration, Explanation, Expansion, and Evaluation). Each stage includes precise and focused steps that greatly helped students acquire detailed knowledge of the shot-put technique.

The application of this model allowed the transfer of skill-related information to the learners effectively, as the model was correctly implemented and involved both the student and the instructor in a collaborative process. The student was not just receiving information from the instructor but actively seeking correct solutions and participating in the learning process based on prior knowledge and new information. This aligns with the perspective of (Izzou Ismail Aftah and Youssef Al-Jaish), who state that "this model relies on organizing the information acquired (by the teacher) on the learner's prior experiences, leading to learning through the development of prior experiences, either by providing new experiences or by organizing what the learner already knows, thus facilitating meaningful learning" (Izzou Ismail Aftah and Youssef Al-Jaish, 2007). This is supported by (Hassan and Kamal, 2003) who note that students interact directly with new experiences, which raises questions that need answers. Through individual or group activities, students discover previously unknown information. Additionally, group work among peers contributed to a broader understanding of the concepts encountered during the exploration and explanation stages. This supports (Nidal Butros, 2004) in

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emphasizing the importance of clear learning steps and the nature of presenting scientific material in a way that meets learners' needs by linking theoretical aspects with practical applications. This approach leaves a noticeable impact on developing students' deductive thinking, enhancing their cognitive and skill capabilities, and making it easier for them to perform mental operations and apply them scientifically.

Furthermore, learning and practicing a specific skill within the bounds of physical activity led to increased learning and development of mental and physical capabilities. "Practice is a crucial variable in the learning process for both simple and complex skills. Effort and training reduce errors" (Osama Kamel Rateb, 1997).

Table (3)

Shows the arithmetic means, standard deviations, and t-values for the pre-test and post-test of the control group.

Significance	Sig	T-Value	Post-Test		Pre-Test		Test
			R	S	R	S	
Significant	0.024	3.189	8.34	40.04	7.91	31.87	**Performance of Shot Put**
Significant	0.015	1.893	1.95	9.50	1.25	8.70	**Achievement in Shot Put**

- Significant at the 0.05 level with 24 degrees of freedom.

Analysis of Results

From Table (3), it is evident that there are significant differences between the pre-test and post-test results for the control group, favoring the post-test. This improvement is attributed to the influence of the educational exercises based on the learning method employed. The educational exercises used, were designed with specific objectives and scientific principles to achieve the desired theoretical and practical learning outcomes.

According to **Mohammed Mahmoud Al-Hailah (1999)**, "Effective implementation of curricula significantly enhances students' overall performance, allowing them to gain additional benefits by developing new learning methods for skills." Educational exercises aim to improve performance through practice, training, and repetition of the learning process. Moreover, "The type of instructional approach and its procedures have a clear impact on skill development. As the duration dedicated to skill performance increases and the number of specialized exercises to develop the specific skill increases, the learning rate also improves."

Thus, the significant improvements observed in the control group can be linked to the structured and repetitive nature of the exercises, which align with the scientific foundations of the learning model used.

Table (4)

Shows the arithmetic means, standard deviations, and t-values for the post-tests of both the experimental and control groups.

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Significance	Sig	Value T	Control Group		Experimental Group		Test
			ع	سَ	ع	سَ	
Significant	0.000	6.685	8.34	40.04	2.17	50.71	**Performance of Shot Put**
Significant	0.000	5.434	1.95	9.50	0.34	11.45	**Achievement in Shot Put**

- *Significant at the 0.05 level with 38 degrees of freedom.

Based on Table (4), it is evident that there are significant differences between the post-test results of the experimental and control groups, with the experimental group performing better. This can be explained by the following points:

1. **Improvement through the Bybee Model**: The table shows that the experimental group, which used the Bybee model, demonstrated superior performance compared to the control group. This reflects the model's impact on enhancing performance and progress in the tests.
2. **Interactive Thinking**: The Bybee model significantly contributed to organizing thinking and actively seeking solutions. The model encouraged students to interact and share their ideas freely, which helped them analyze educational situations and reach independent solutions. This interaction led to improved performance due to increased confidence and a sense of responsibility among students.
3. **Interactive Educational Opportunities**: By providing students with opportunities for interactive thinking and analyzing and critiquing play situations, the model achieved notable progress. Studies indicate that modern teaching models, such as the Bybee model, create an encouraging learning environment, which enhances students' motivation to learn.
4. **Role of Repetition and Practical Application**: Repetition and the use of various educational tools within the model contributed to improving students' skills. Continuous practice and application of exercises within the model had a positive effect on final results. This aligns with what Al-Mamouri (2018) stated, that modern teaching models improve the learning environment by encouraging active participation and correcting misconceptions, thereby enhancing learners' motivation and achieving better educational outcomes.

- Conclusions and recommendations:

5-1 Conclusions:

From the results presented, analysis and discussion, the researcher reached the following conclusions:

• The use of the Bybee learning model has an effective impact on learning the effectiveness of weight pushing in the research sample.

• The excitement, thrill and competition resulting from using the Bybee model increased students' motivation to perform and facilitated the process of learning the effectiveness of weight pushing.

5-2 Recommendations:

• Adopting the Bybee learning model in teaching the effectiveness of weight pushing.

• Using the Bybee learning model because it facilitates the teacher's process of applying and achieving the educational objectives set.

• Conducting a study similar to the current study on other sports skills and at different age and academic stages.

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Appendices

Appendix (1)
Names of Professors and Experts Consulted for Personal Interviews:

Working place	Specialty	The scientific title	Expert	ت
College of Physical Education and Sports Sciences - Ashur University	Biomechanics_Athletics	Prof	Dr. Sareeh Abdul Karim	1
College of Physical Education and Sports Sciences - University of Baghdad	Training Science_Athletics	Prof	Dr. Iman Abdel Amir	2
College of Physical Education and Sports Sciences - University of Baghdad	Training Science_Athletics	Prof	Dr. Ahmed Mohamed	3

Appendix (2)
Sample Educational Unit Using the Bybee Model
Educational Objectives:

- Accustoming students to discipline, order, and self-confidence

Skill Objectives:

- Learning the shot-put technique

Duration: 45 minutes

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Notes	Details	Plan parts	Time	Section
	- Preparing the tools - Standing in a row and taking attendance - Jogging around the field -Warm-up and stretching exercises and preparing the body parts for exercise.	Warm up	7 د	preparatory
	- At this stage, the teacher begins a dialogue with his students about the weight-pushing skill that he wants to learn and links it to the previous experiences that the students have that are related to the weight-pushing skill. - Giving an initial idea about the lesson content -Some information and questions about the theoretical aspect of the weight-pushing skill		**Educational section 15 m**	**Main 35 m**
	The teacher divides the students into 4 groups. - The teacher asks the learners questions about the weight-pushing skill to link previous and subsequent experiences. - Provide enough time for the students to search for answers (within the available plan time) and give them the necessary directions - The teacher asks the learners what experience they will discover regarding the weight-pushing skill -The learners write down their notes and are directed to discover the experiences related to the weight-pushing skill -	**Concept Discovery Phase m 6**		
Emphasizing the timing of each stage and working accordingly	After the end of the second stage, the teacher begins to listen to the students' answers about what they discovered in the second stage about the skill of pushing the weight. After that, he discusses the performance with them by returning them to sit in front of the (flex) or the display device (data show). Then he begins the stage of explaining each stage of the technical performance of the skill of pushing the weight, so	**Explanation phase 16 m**		

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	that he explains to the students how to perform it correctly, common mistakes, and the reasons for those mistakes, so that they reach the correct concept for performing this skill. Discussing the ideas of the learners and allowing them to express their opinions			
	At this stage, students begin to apply the actual performance of the weight-pushing skill after completing their understanding of the skill through the previous three stages. The expansion stage means that the student practices a greater number of repetitions in performing the weight-pushing skill that they want to learn, with the teacher present to provide correct feedback and guidance Performing the practical exercises (17, 13, 9) that are prepared in advance	Expansion phase min 20	**Applied section 20 m**	
	Performance is evaluated by the teacher to reach the correct ideal form, and students receive feedback immediately (during the exercise) or later (after the exercise), and the evaluation is continuous and integrated (and the evaluation can .be done at all stages of the Bybee model)	Evaluation stage		
	- Collect tools. .Students stand in a square, calm down, leave -	**3m**		**Final section**

Appendix 3
Pushing weight performance form
Expert name :

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Sum 100	Balance and stability 10 points	Throwing and throwing position 50 degrees	Slide 25	Curvature 15degrees	Name	No.
						1

Note: The experts agreed on the necessity of merging the throwing position stage with the throwing stage in one evaluation due to their joint and influential connection to the overall technical performance, and dispensing with the initial pause due to its lack of actual involvement in influencing the remaining stages.