



Towards the Development of an Achievement Test

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August 25, 2023
Manila Diamond Hotel



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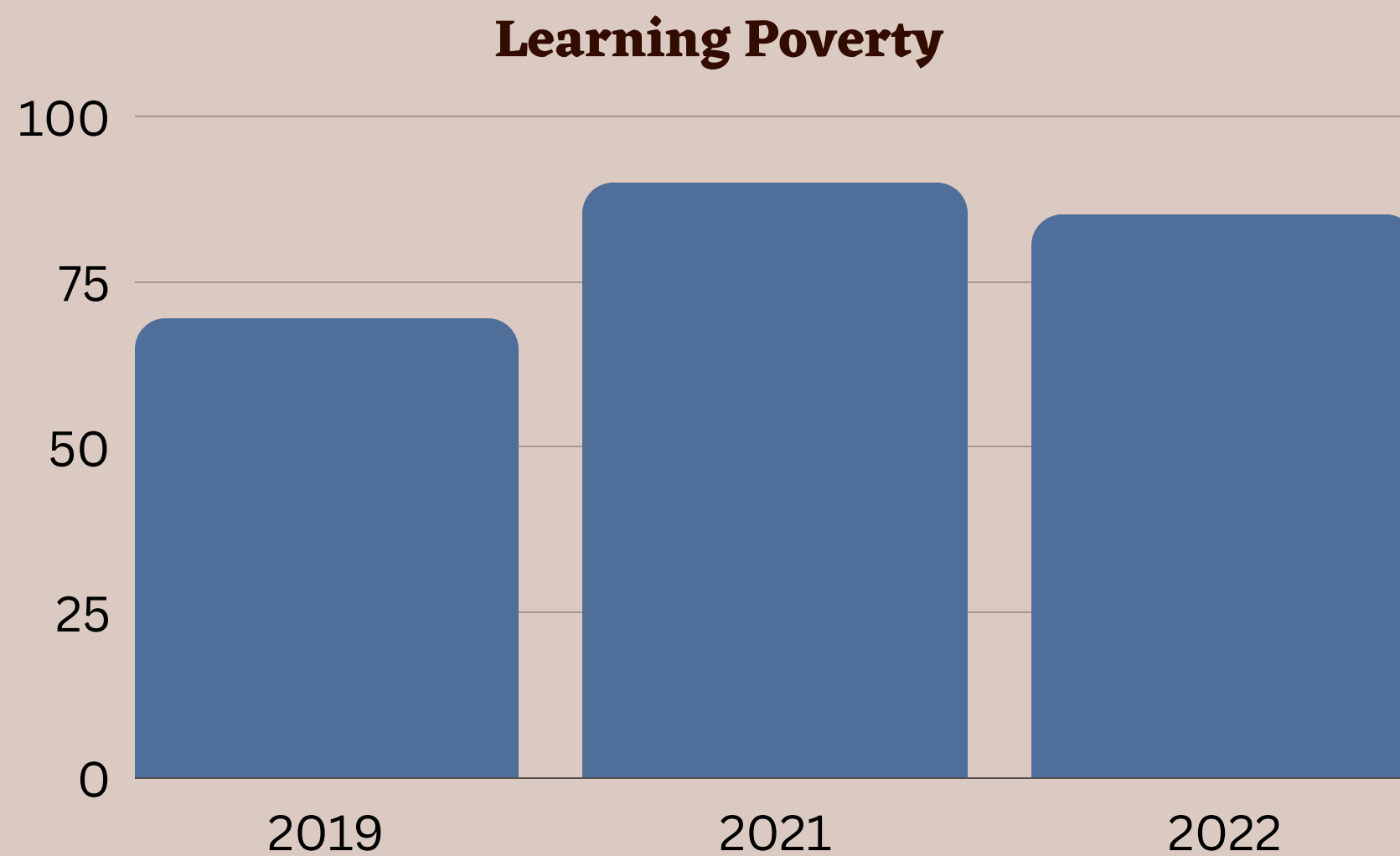
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Introduction

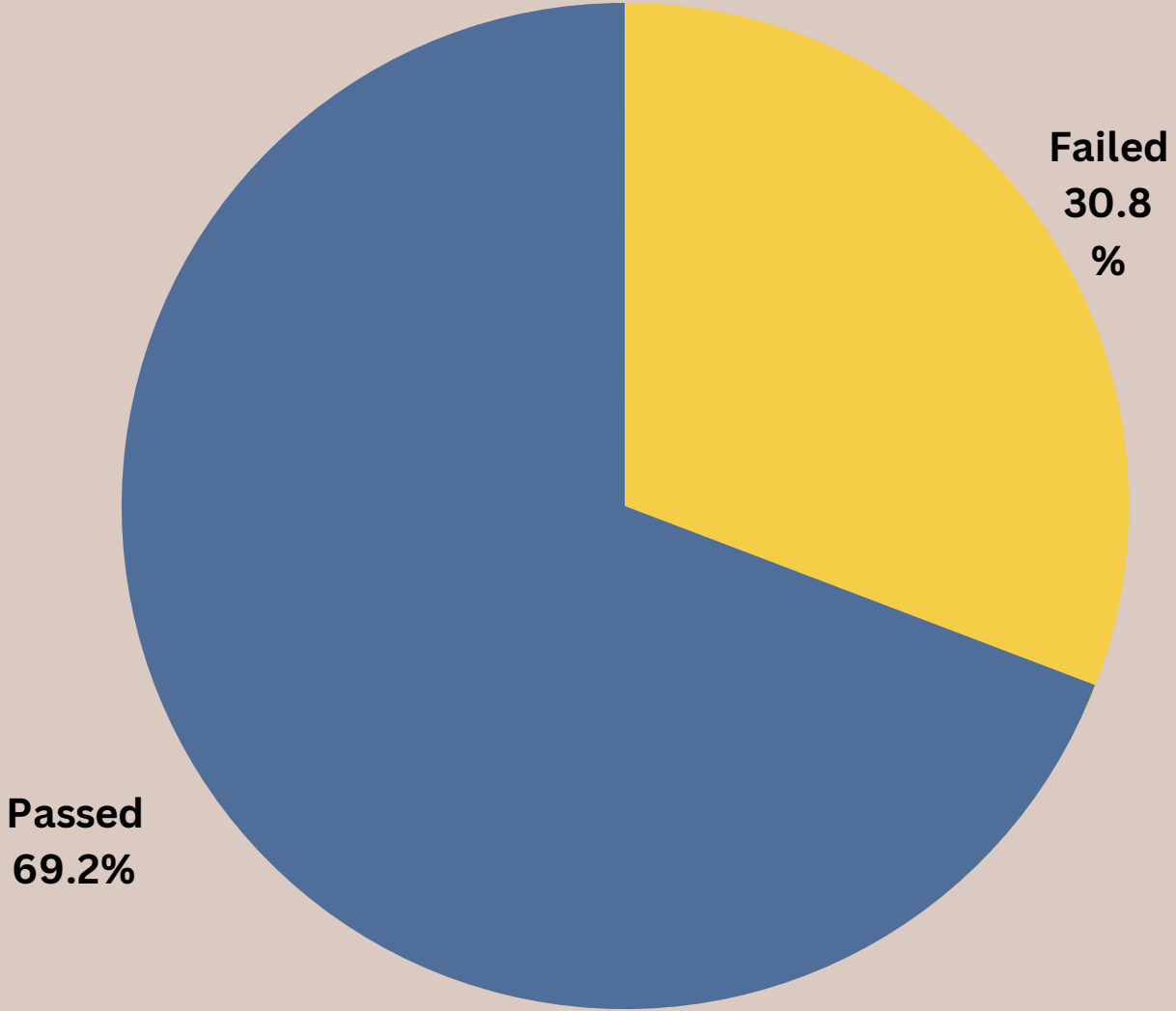
Despite being called a developing country, the Philippines has been the focus of news and articles about low-quality education.



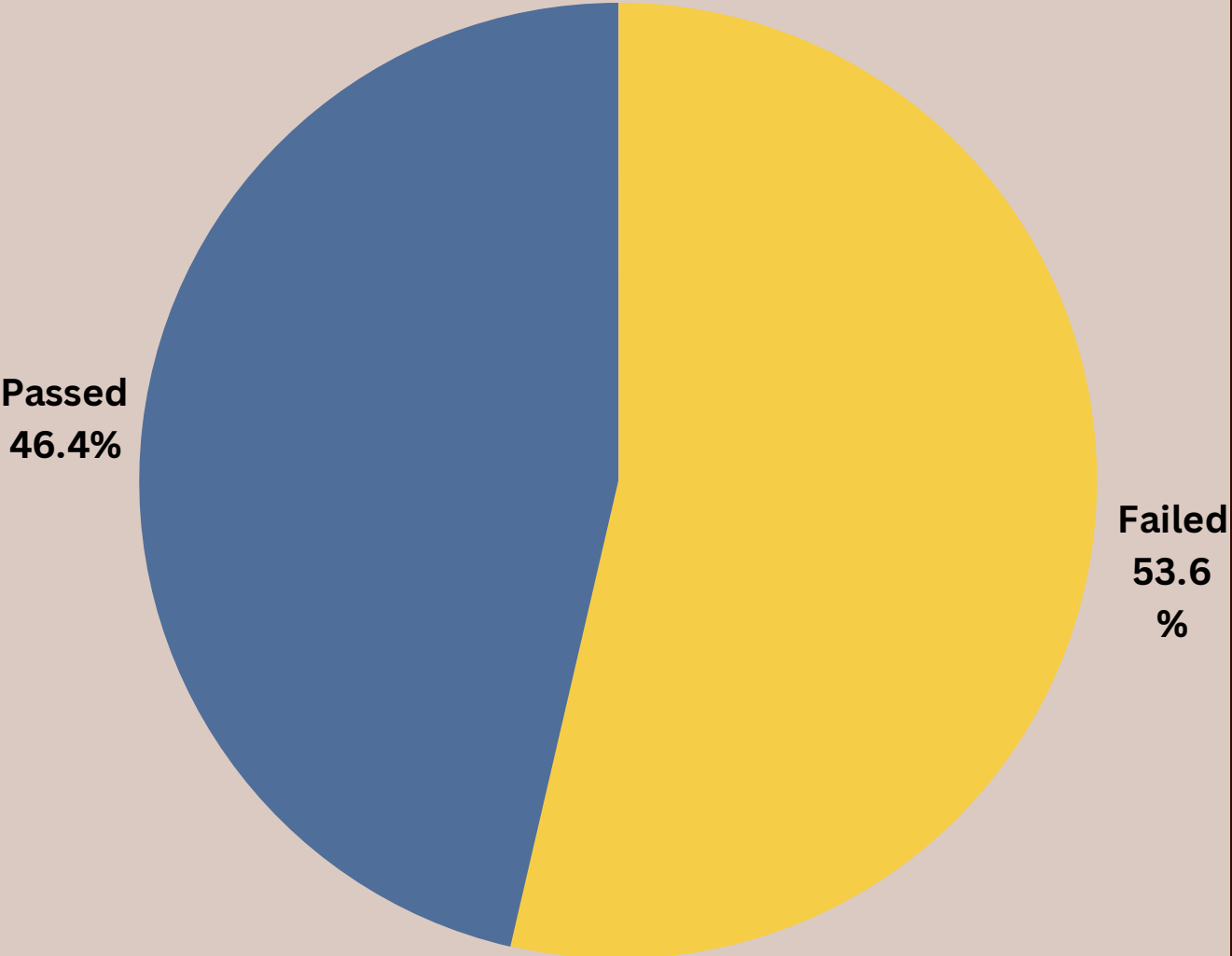
The World Bank, 2019; De Vera, 2022



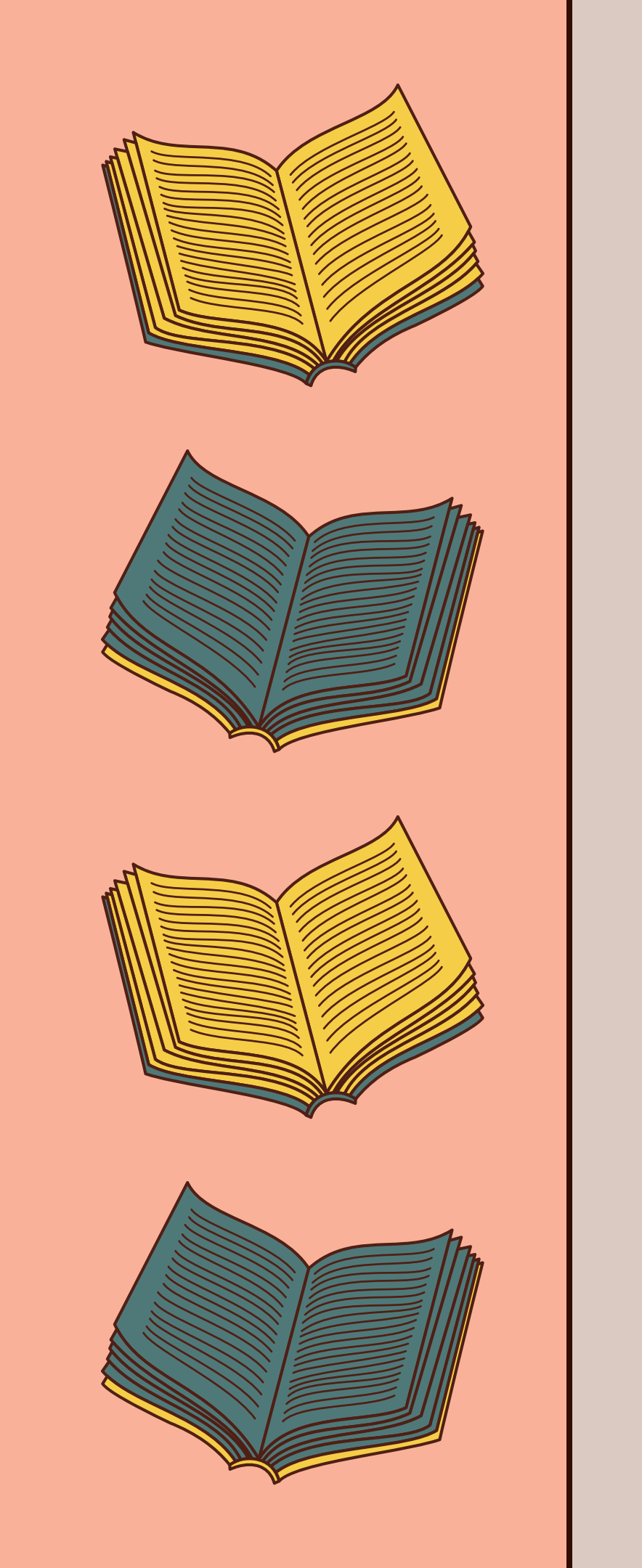
2019 - 2020 National Achievement Test results



Grade 6



High school





Underlying causes of low quality education in the Philippines:

Librea et al., 2023:

- lack of educational resources
- inclusion of learners-at-risk
- lack of reading enthusiasm
- teacher's competence
- lack of reading elements

Okabe, 2013

- congested curricula of the Basic Education Curriculum (BEC) and Secondary Education Curriculum (SEC)



Department of Education's Response:

- implementation of K to 12 curriculum
- adoption of RAPID Framework (The World Bank, 2022):

Reach every child and keeps them in school

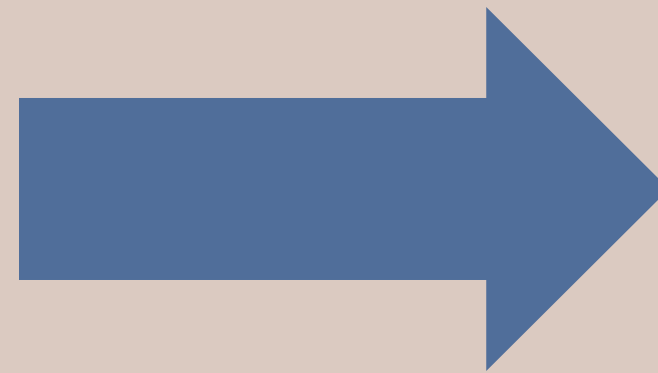
Assess learning levels regularly

Prioritize teaching the fundamentals

Increase the efficiency of instructions

Develop psychosocial health and

well-being, or ensuring the child's safety and welfare against violence and malnutrition




Department of Education Order No. 8:

"**assessment allows the teachers to track students' progress...and assessment informs** the learners, their parents and their guardians of their progress...to promote self-reflection and personal accountability among students about their learning, and to provide bases for the profiling of student performance on the learning competencies and standards of the curriculum." (Department of Education, 2015)



Achievement tests



should undergo a series of **standardization** and must be **aligned with a curriculum** containing the required fundamental skills and learning competencies (Pandora et al., 2017).



Achievement Test Development Process (Sahin et al.,2022):



Test developers identify the test's characteristics, the type of test, content, relevance, and goals.

Item bank and table of specifications are developed. Pilot testing of the items and item analysis is also crucial to this step.

This is to ensure that the items align with a set standard or curriculum after receiving comments from subject matter experts.

Test developers must develop materials containing the administration and scoring of the test

Finalizing and revising the test if needed.



This paper aims to:

- Develop a test that uses the Cognitive Process Dimension by Anderson and Krathwohl as a framework, focusing more on the higher order thinking skills
- To further aid learners in meeting the standards and competencies prescribed and can help educators build a nation of skilled Filipinos.

Methods

strategies, processes, or techniques utilized in this research



Research Design

- Development and Validation Design
- K to 12 Curriculum
- Multiple-choice type of test
- Cognitive Process Dimension

Population and Sample

- 24 private schools
- 82,412 respondents

Data Collection and Analysis

- Xcalibre™ Software
- Item-Response Theory Analysis (3-parameter logistic model)

Xcalibre™ Specifications

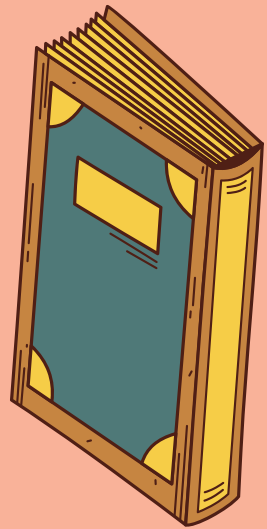
Flag Specifications

Specification	Value	Specification	Value
Low a Flag Bound	0.5	High a Flag Bound	1.5
Low b Flag Bound	-1	High b Flag Bound	1
Low c Flag Bound	0	High c Flag Bound	0.3
Key Flag	K	Fit Flag	F
Low a Flag	La	High a Flag	Ha
Low b Flag	Lb	High b Flag	Hb
Low c Flag	Lc	High c Flag	Hc

IRT Calibration Specifications

Specification	Value	Specification	Value
IRT Specification	Dichotomous	Model constant	1.7
Polytomous IRT Model	N/A	Dichotomous IRT Model	3-parameter
Minimum a	0.05	Maximum a	6
Minimum b	-4	Maximum b	4
Minimum c	0	Maximum c	0.7

Results

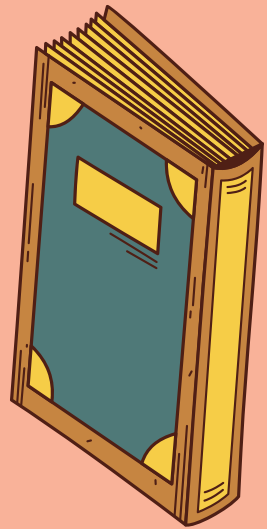


Summary Statistics

Parameter	Items	Mean	SD	Min	Max
a	50	1.136	0.205	0.652	1.483
b	50	0.42	0.824	-1.678	2.054
c	50	0.243	0.018	0.211	0.332

Overall Model Fit

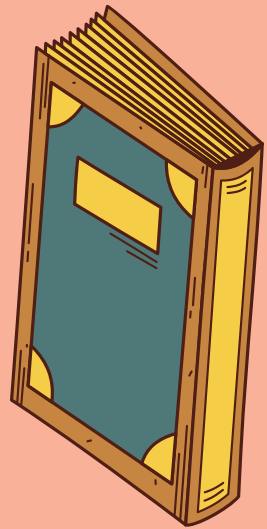
Items	Chi-square	df	p	-2LL
50	753.074	600	0	23349



Results: Item Parameters for All Calibrated Items

Specification	Value	Specification	Value
Key Flag	K	Fit Flag	F
Low a Flag	La	High a Flag	Ha
Low b Flag	Lb	High b Flag	Hb
Low c Flag	Lc	High c Flag	Hc

Item ID	P	R	a	b	c	Flag(s)
1	0.897	0.315	0.98	-1.678	0.221	Lb
2	0.48	0.366	0.949	0.595	0.227	
3	0.74	0.475	1.343	-0.42	0.332	F, Hc
4	0.478	0.351	0.929	0.642	0.244	
5	0.338	0.147	1.041	1.669	0.259	Hb
6	0.264	0.168	1.208	1.825	0.229	Hb
7	0.74	0.525	1.448	-0.563	0.24	
8	0.763	0.481	1.194	-0.696	0.243	
9	0.637	0.267	0.652	-0.07	0.258	
10	0.733	0.504	1.288	-0.5	0.251	
11	0.389	0.244	1.017	1.169	0.25	Hb
12	0.779	0.481	1.443	-0.687	0.253	
13	0.648	0.454	1.069	-0.176	0.243	
14	0.506	0.439	1.327	0.476	0.25	
15	0.586	0.41	1.09	0.177	0.256	
16	0.657	0.412	0.944	-0.191	0.25	
17	0.621	0.476	1.171	-0.031	0.245	
18	0.768	0.521	1.445	-0.684	0.241	
19	0.462	0.267	1.026	0.87	0.266	
20	0.662	0.439	0.963	-0.255	0.245	
21	0.543	0.424	1.071	0.306	0.245	
22	0.74	0.416	0.947	-0.652	0.243	
23	0.425	0.342	1.228	0.862	0.25	
24	0.4	0.332	1.19	0.961	0.243	
25	0.552	0.464	1.111	0.213	0.236	



Results: Item Parameters for All Calibrated Items

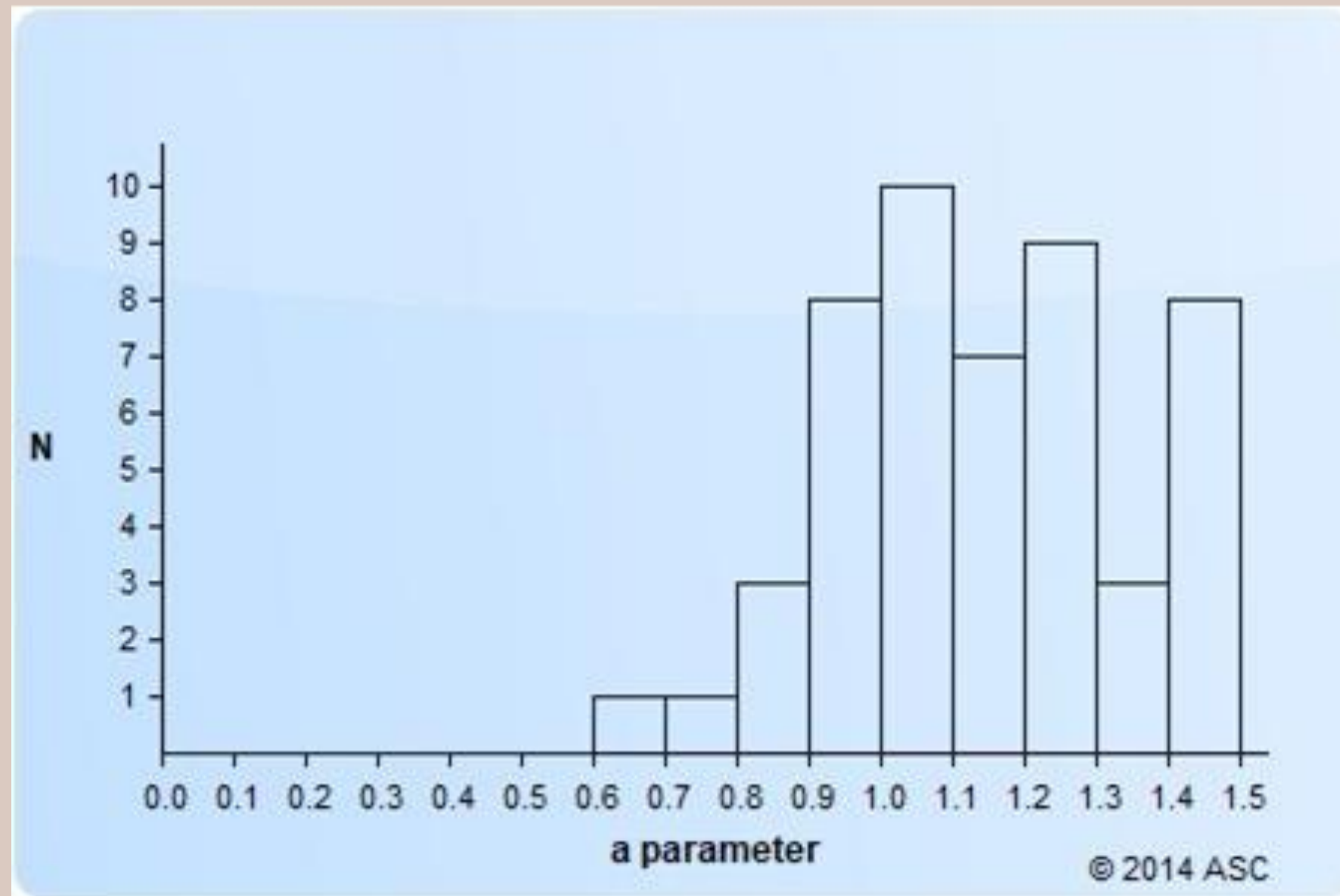
Specification	Value	Specification	Value
Key Flag	K	Fit Flag	F
Low a Flag	La	High a Flag	Ha
Low b Flag	Lb	High b Flag	Hb
Low c Flag	Lc	High c Flag	Hc

Item ID	P	R	a	b	c	Flag(s)
26	0.386	0.439	1.318	0.79	0.216	
27	0.669	0.358	0.81	-0.267	0.249	
28	0.347	0.256	1.247	1.284	0.244	Hb
29	0.51	0.489	1.257	0.376	0.235	
30	0.614	0.357	0.822	0.057	0.257	
31	0.237	0.136	1.292	1.944	0.221	Hb
32	0.554	0.504	1.439	0.227	0.242	F
33	0.274	0.106	1.064	2.054	0.239	Hb
34	0.703	0.385	0.858	-0.439	0.251	
35	0.315	0.141	1.066	1.722	0.248	K, Hb
36	0.664	0.555	1.483	-0.245	0.236	
37	0.462	0.395	1.084	0.652	0.24	
38	0.609	0.445	0.966	-0.009	0.242	
39	0.283	0.286	1.448	1.332	0.215	Hb
40	0.524	0.44	1.042	0.348	0.236	
41	0.411	0.391	1.432	0.803	0.236	
42	0.414	0.42	1.433	0.738	0.228	
43	0.354	0.366	1.153	1.036	0.22	Hb
44	0.513	0.298	0.705	0.596	0.249	
45	0.513	0.416	1.216	0.454	0.248	
46	0.32	0.379	1.261	1.117	0.211	Hb
47	0.704	0.407	0.901	-0.456	0.247	
48	0.275	0.143	1.127	1.831	0.233	Hb
49	0.346	0.399	1.205	1.032	0.214	Hb
50	0.459	0.3	1.117	0.855	0.265	

Results



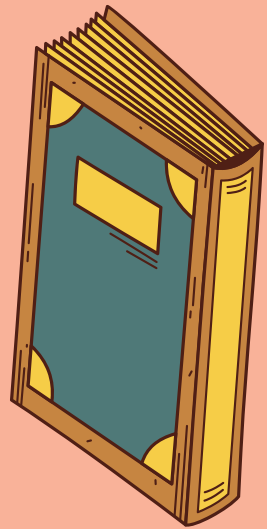
Histogram of the a Parameters



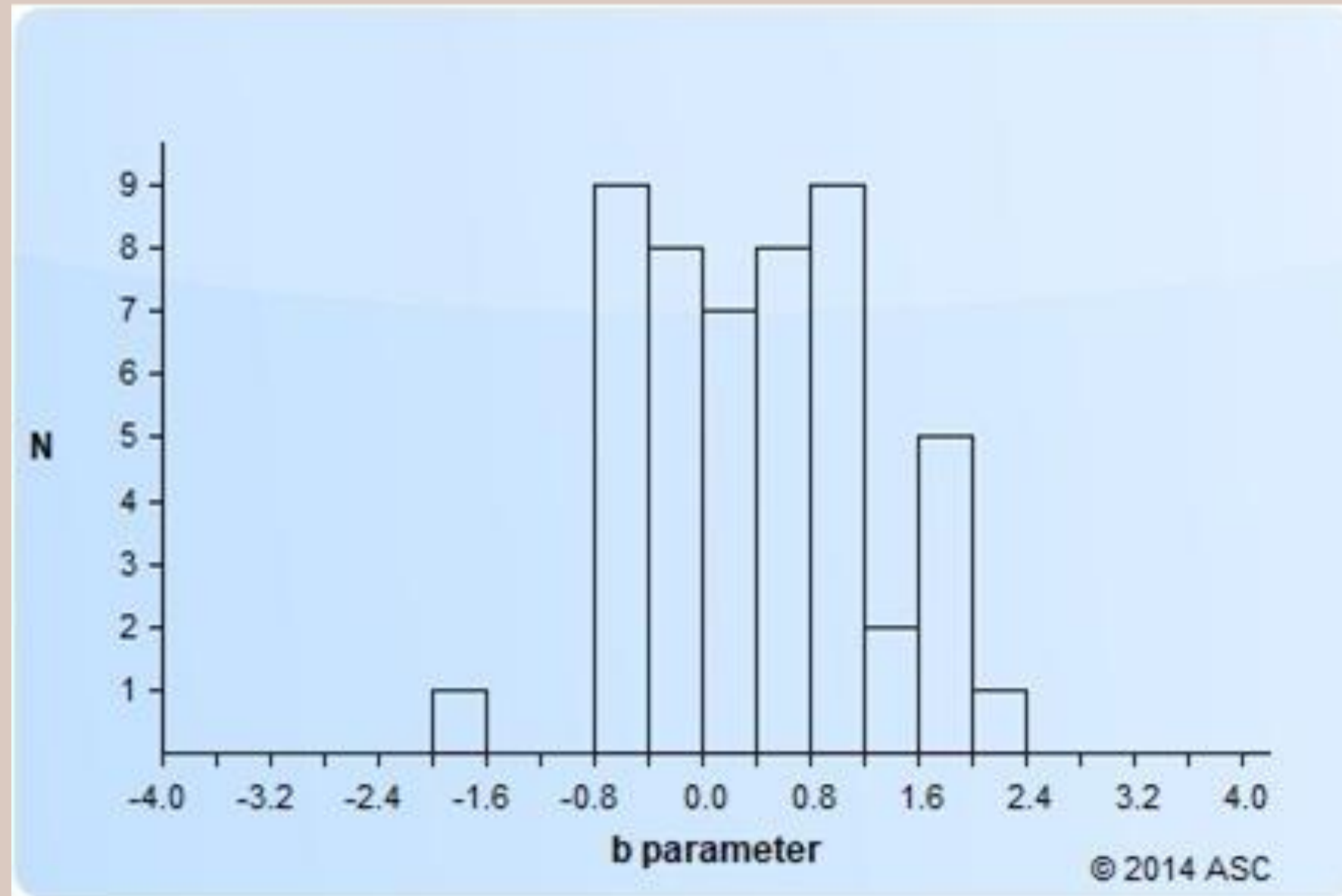
Frequency Distribution for the a Parameters

Range	Frequency
0.00 to 0.10	0
0.10 to 0.20	0
0.20 to 0.30	0
0.30 to 0.40	0
0.40 to 0.50	0
0.50 to 0.60	0
0.60 to 0.70	1
0.70 to 0.80	1
0.80 to 0.90	3
0.90 to 1.00	8
1.00 to 1.10	10
1.10 to 1.20	7
1.20 to 1.30	9
1.30 to 1.40	3
1.40 to 1.50	8

Results



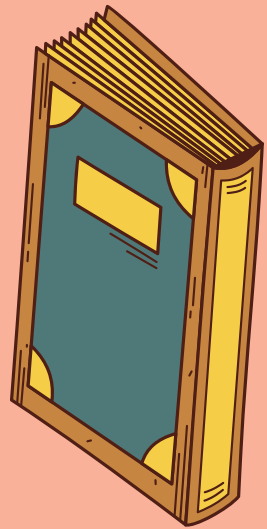
Histogram of the b Parameters



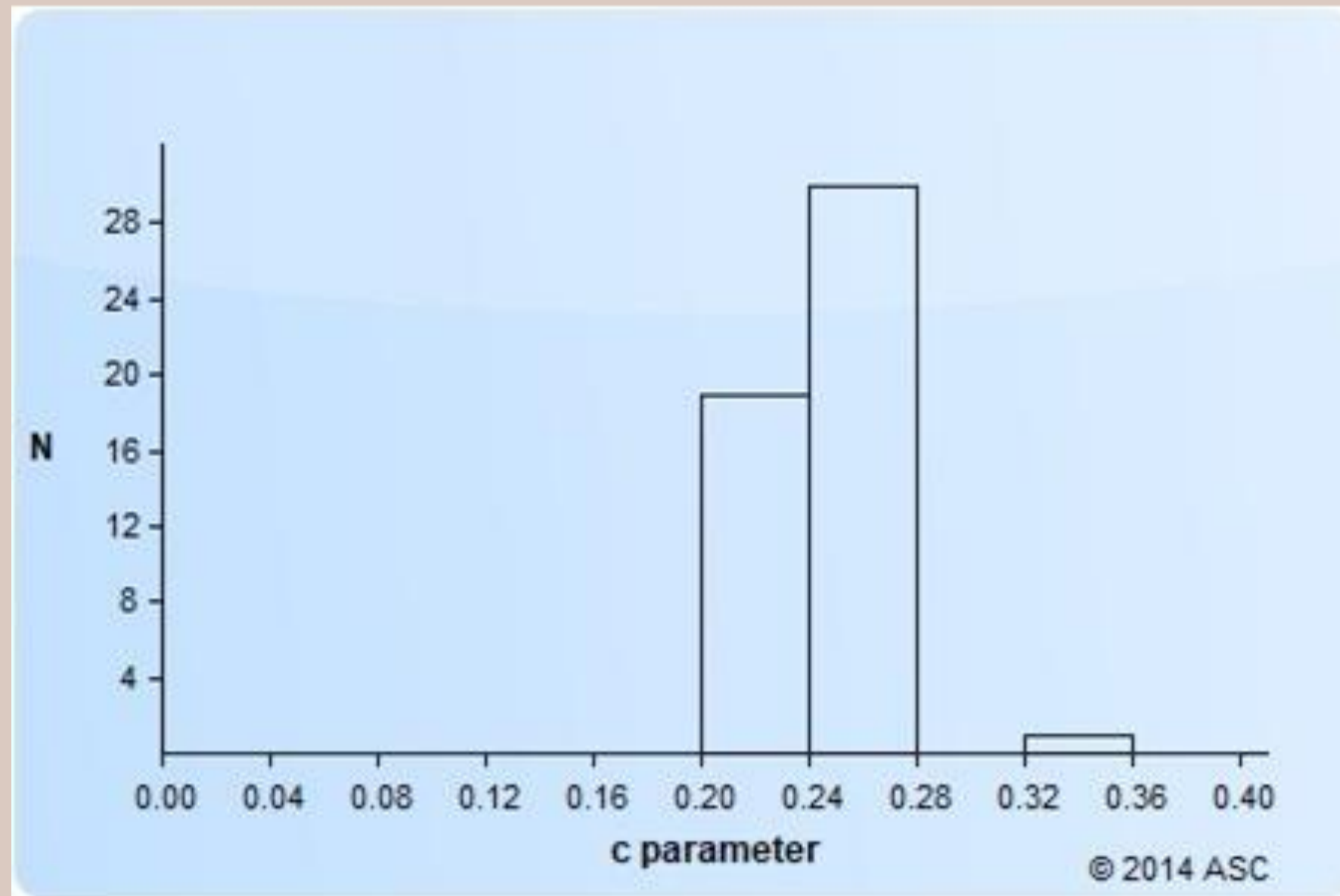
Frequency Distribution for the b Parameters

Range	Frequency
-4.0 to -3.6	0
-3.6 to -3.2	0
-3.2 to -2.8	0
-2.8 to -2.4	0
-2.4 to -2.0	0
-2.0 to -1.6	1
-1.6 to -1.2	0
-1.2 to -0.8	0
-0.8 to -0.4	9
-0.4 to 0.0	8
0.0 to 0.4	7
0.4 to 0.8	8
0.8 to 1.2	9
1.2 to 1.6	2
1.6 to 2.0	5
2.0 to 2.4	1
2.4 to 2.8	0
2.8 to 3.2	0
3.2 to 3.6	0
3.6 to 4.0	0

Results



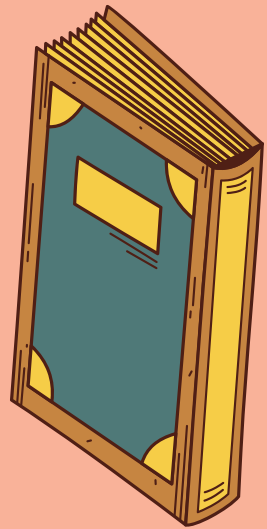
Histogram of the c Parameters



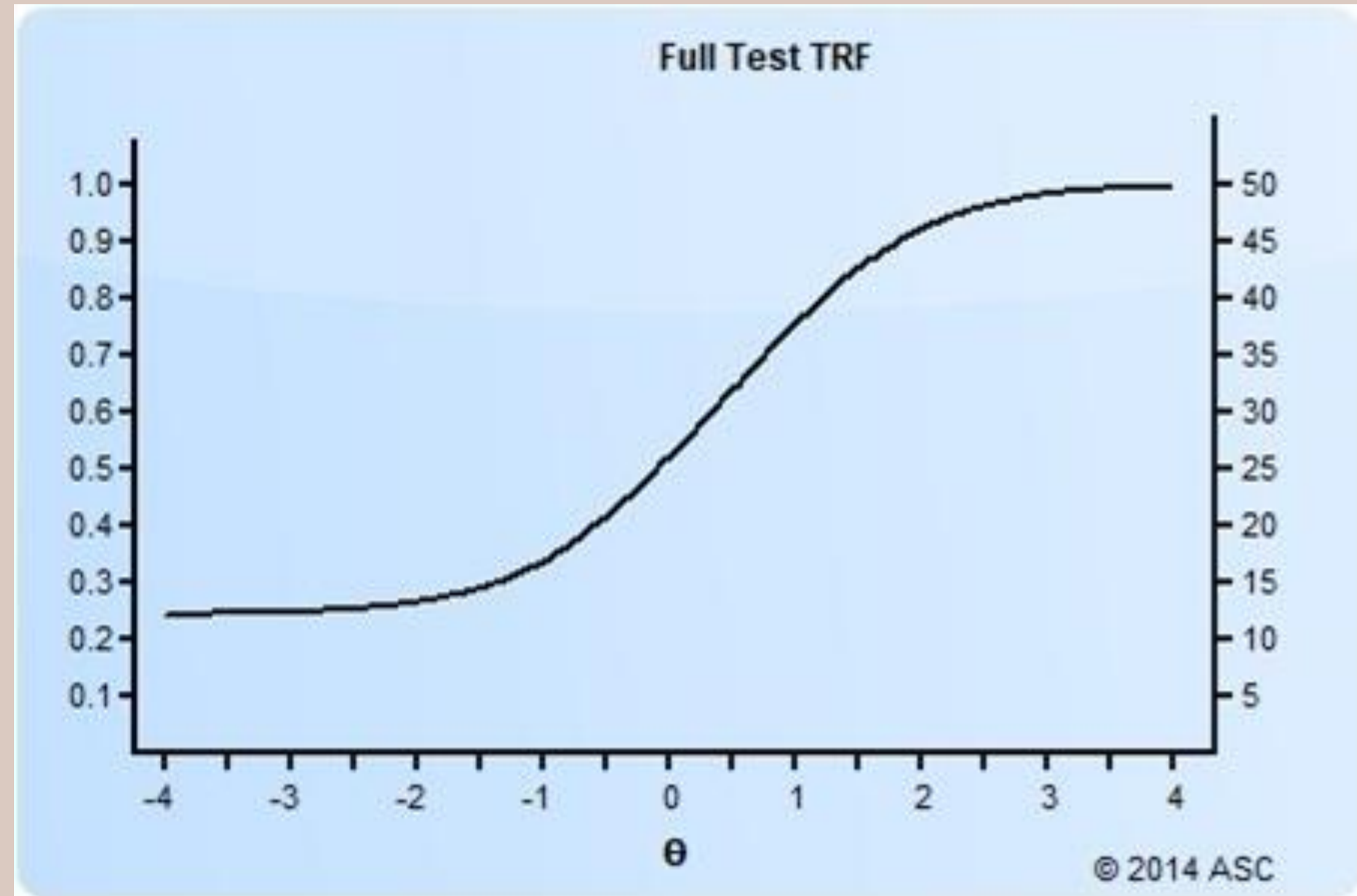
Frequency Distribution for the c Parameters

Range	Frequency
0.00 to 0.04	0
0.04 to 0.08	0
0.08 to 0.12	0
0.12 to 0.16	0
0.16 to 0.20	0
0.20 to 0.24	19
0.24 to 0.28	30
0.28 to 0.32	0
0.32 to 0.36	1
0.36 to 0.40	0

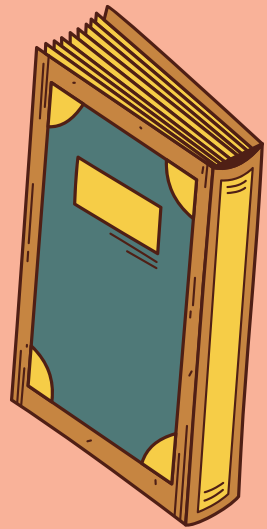
Results



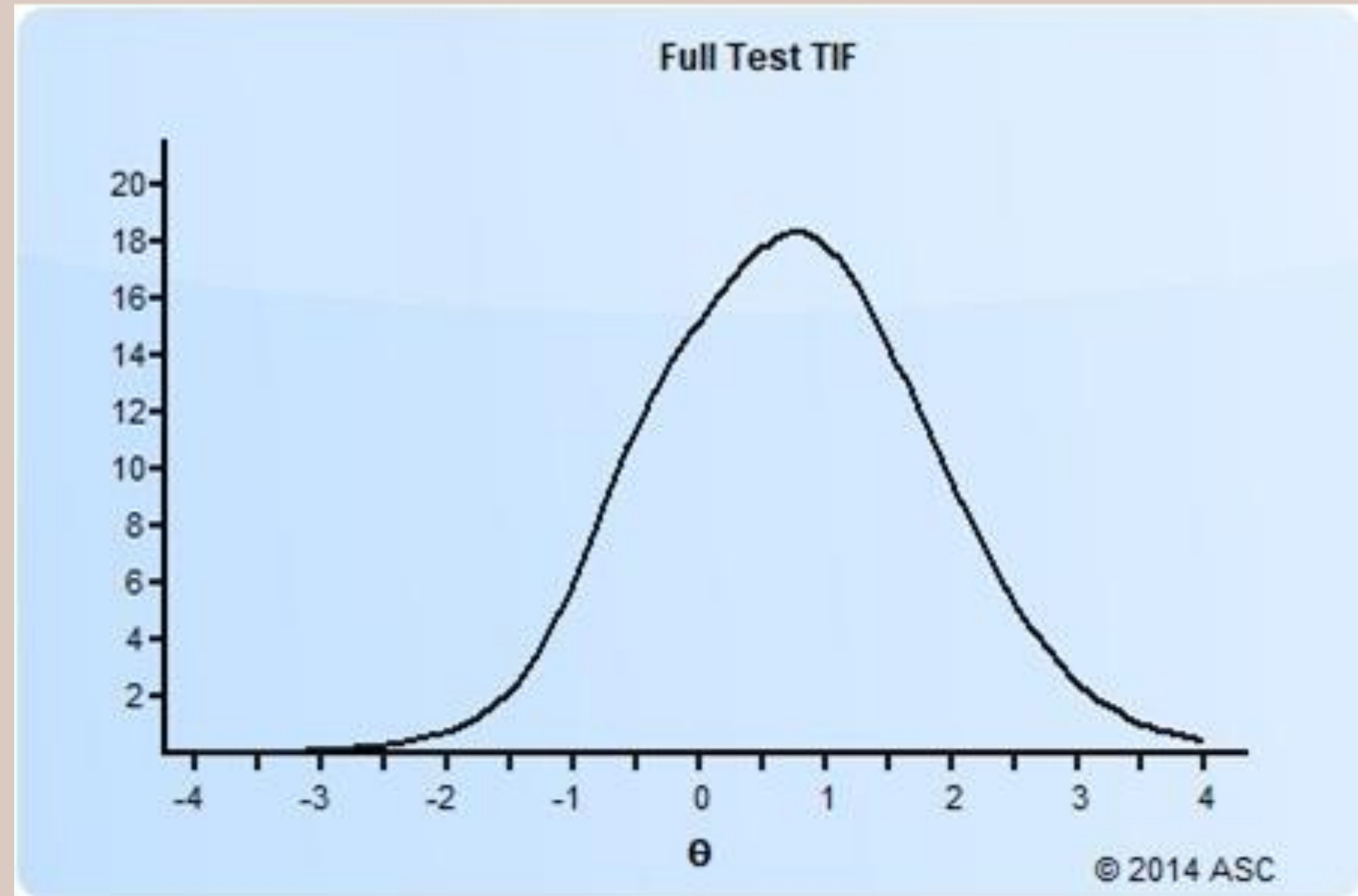
Test Response Function



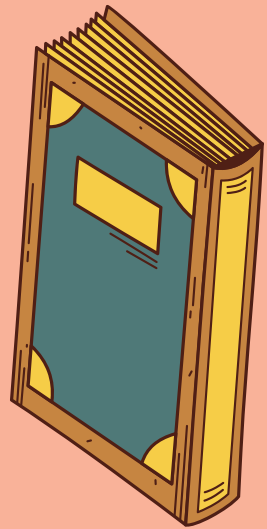
Results



Test Information Function



Results: Item-by-item



Frequency Distribution for the a Parameters

ID	Model	Key	Scored	Num Options	Domain	Flags
3	3PL	C	Yes	4	1	F, Hc

Classical statistics

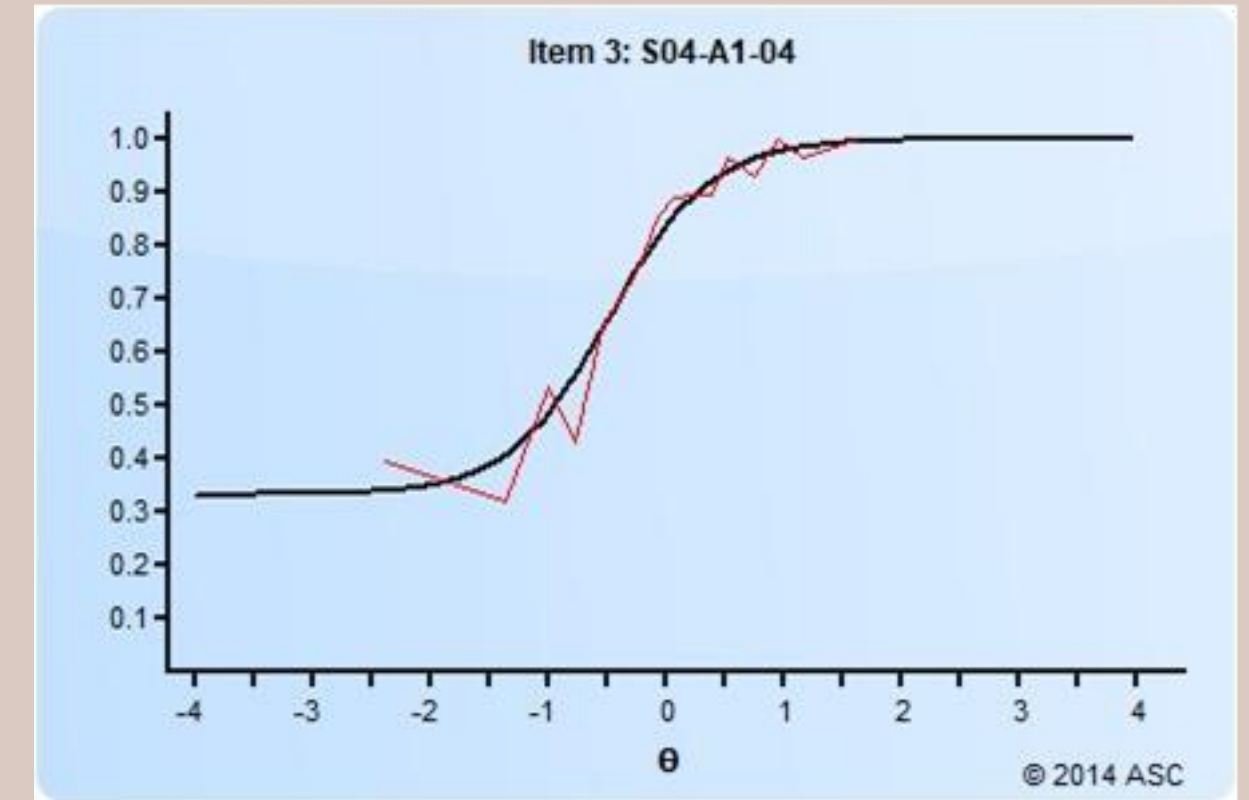
N	P	S-Rpbis	T-Rpbis	Alpha w/o
435	0.74	0.475	0.494	0.897

Item Parameters

a	b	c	a SE	b SE	c SE	Chi-sq	df	p	z Resid	p
1.343	-0.42	0.332	0.13	0.085	0.182	6.931	12	0.862	5.576	0.00

Option Statistics

Option	N	Prop.	S-Rpbis	T-Rpbis	Mean	SD	
A	28	0.064	-0.241	-0.324	-2.246	2.427	
B	48	0.11	-0.304	-0.276	-1.521	1.911	
C	322	0.74	0.475	0.494	0.217	1.072	**KEY**
D	35	0.08	-0.179	-0.172	-1.194	1.971	
Omit	2	0.005	-0.079	-0.057	-1.609	2.528	
Not Admin	0						



Results

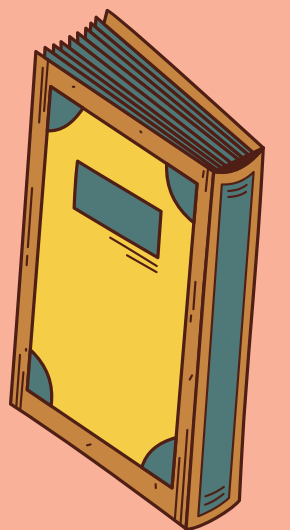
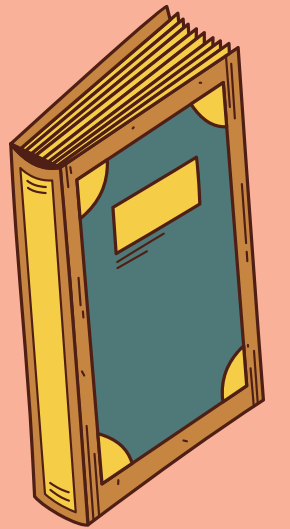
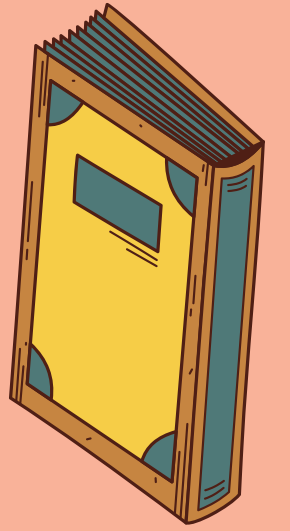


Internal Consistency Reliability

Grade Level	Cronbach's Alpha (α)	Number of Items
Grade 4	0.90	50

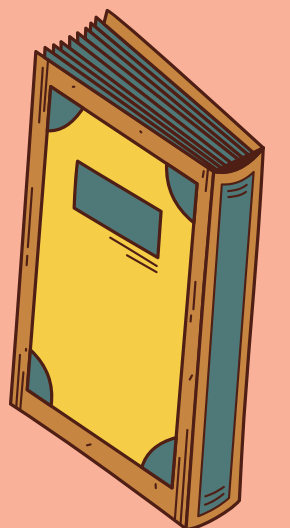
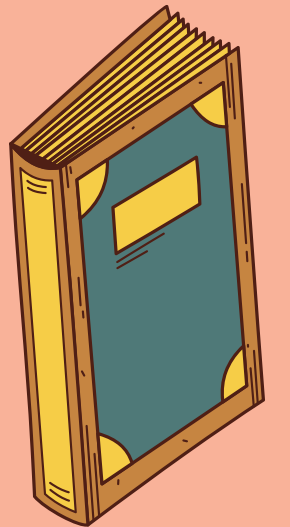
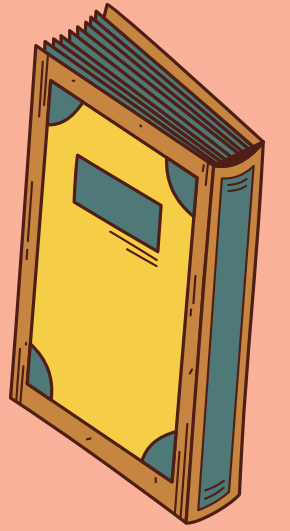
Discussion

- Results showed that the achievement test developed is **valid and reliable**
- There is also an alignment in the test developed to the **cognitive process dimension**, measuring the **higher-order thinking skills** of the students



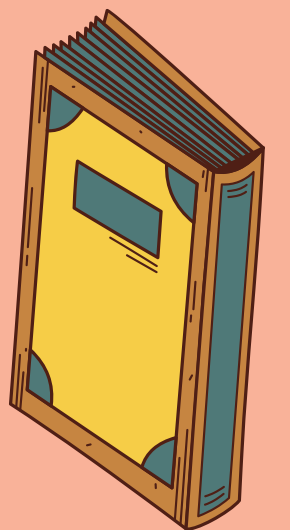
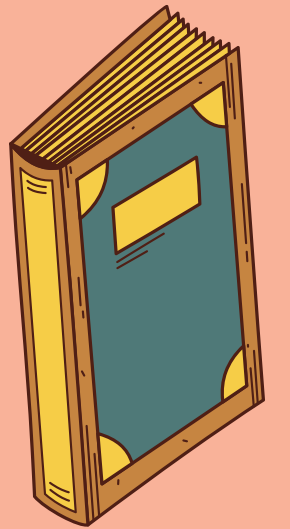
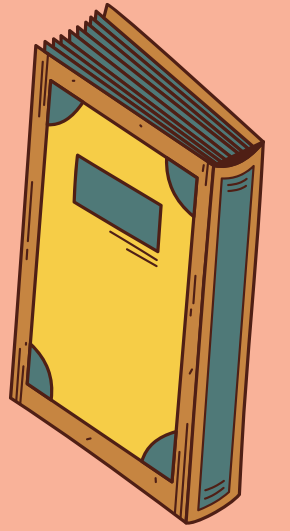
Discussion

- An assessment that follows the standard process of development can have an **enormous impact** on a nation's educational system:
 - For teachers:
 - Standardized assessment can also **guide teachers in decision-making** and **creating quality instruction**
 - This can help teachers to **assess the academic performance** of the students in an objective manner (Sharma, 2015; Gatlin-Nash, et al., 2022).
 - For the students:
 - The result will help **hone their critical thinking skills** and **master basic skills** that will prepare them for college and, or employment (Jimaa, 2011).



Discussion

In summary, developing an assessment that has undergone the scientific process of development can be **a way to lessen the learning poverty** in the Philippines. Of course, with the help and support from the government and school administrations, this adversity can be eradicated and a healthy environment for education will be made for Filipino students.





Recommendations

The following recommendations were developed by the researchers

- Conduct further validity studies such as **construct validity** wherein the newly developed achievement test will be correlated with a teacher-made test
- Conduct **qualitative study** such as interviewing the clients (school administrators, students, as well as parents) on the usefulness and effectiveness of the results of the achievement test
- Conduct item audit upon the release of the **new curriculum** by the DepEd

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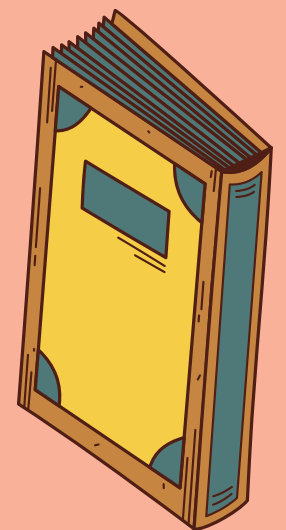
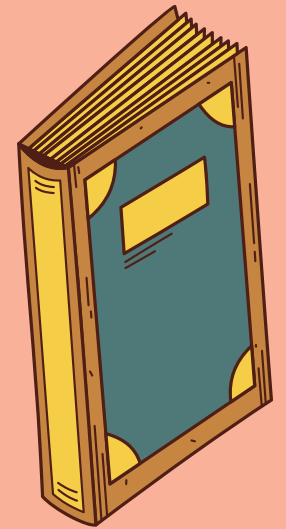
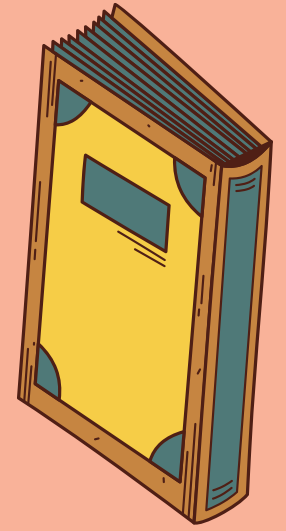
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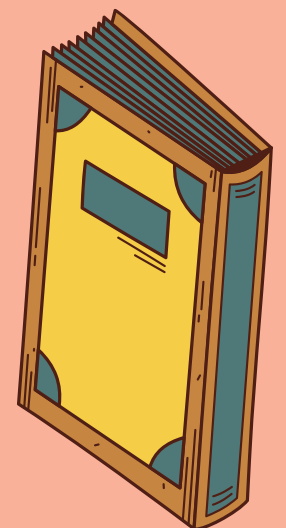
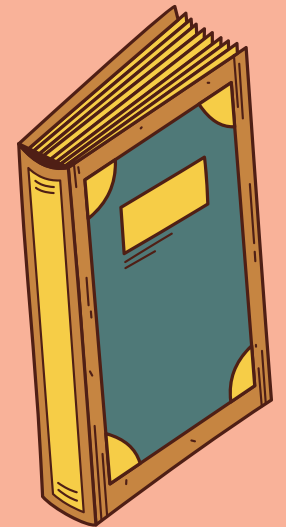
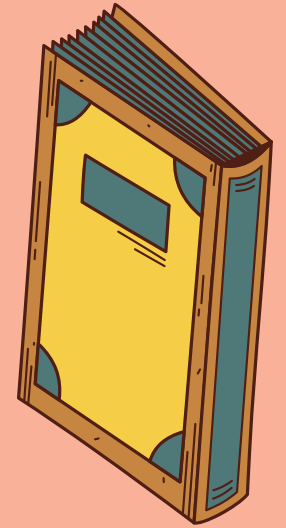
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Thank you for actively listening!

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