1933

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Brown, E. F.
Thesis 1933

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School of Education
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SCHOOL OF EDUCATION

THESIS

OBJECTIVE COMMUNITY CHECK THROUGH WHAT FORMER PUPILS ARE DOING, ON WHAT COMMERCIAL ARITHMETIC TO TEACH

Submitted by

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(B. S., Boston University, 1929)

In partial fulfillment of requirements for the degree of Master of Education

First Reader: Guy M. Wilson, Professor of Education
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P R E F A C E

In making an objective community check through what former pupils are doing, on what commercial arithmetic to teach I have tried to obtain information that is typical of that used in the community and practical for a high school commercial arithmetic course.

I wish to acknowledge with much gratitude the assistance rendered me by the business men and former pupils who have so generously given their time and service in furnishing invaluable information concerning their business methods and procedures.

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CHAPTER I

NEED FOR THE STUDY

The two points of view for determining what to teach in any subject are the actual need or usage, either present or future, of material taught; and the strictly disciplinary benefit gained from the mastery of processes. When the theory of faculty psychology predominated, little attention was paid to the use of material taught for the idea prevailed that there was a transfer of learning from one subject to another.

Now, from recent tests and studies Pyle states "There is no evidence that the doctrine of formal discipline--that the mind gains strength through use and that this strength is available for whatever the mind undertakes--has any foundation."[1] Dewey's theory "We learn to do by doing", gave impetus to the investigation of actual social usage of material taught.

The evolution of business from a simple rural community one man store to the complex incorporated manufacturing and distributing agencies has brought many added problems into the teaching of commercial arithmetic. Naturally, pupils, who have a knowledge of and have gained skill in the actual work they undertake when they graduate, should be more successful than those who have no training.

The teacher of commercial arithmetic is training pupils strictly for vocational positions. Commercial arithmetic

1. Pyle, Wm. H.--The Psychology of Learning--Warwick & York, Inc., Baltimore 1928--page 328

stands or falls on its usefulness to graduates. If the students no longer use the arithmetic taught in their work when they leave school, then the time would be more profitably spent on other subjects that they would use in business.

In order that I might be a more competent teacher of commercial arithmetic, I decided to make a community check to find out exactly what arithmetic to teach my classes, basing my decision on the arithmetic used by former pupils now occupying business positions.

The study was necessarily local and the findings primarily beneficial for local classes. There may, however, be some benefit derived for commercial classes in general.

CHAPTER II

PREVIOUS STUDIES BY OTHERS

Professor Frederick G. Nichols of Harvard made an investigation in 1926 called "A New Conception of Office Practice", which was based on an investigation of actual requirements for bookkeeping, stenographic, and clerical positions. He states, "The common belief that clerical duties of the non-stenographic and non-bookkeeping variety are done by workers who have had no secondary school training has no foundation."[1] He also says, "In employing office workers business men will give the preference to trained people as against untrained applicants."[2] "From the standpoint of clerical training it is clear that not all clerks need extensive courses in business arithmetic, but it is equally clear that the need for short, intensive drill in this subject exists and that existing courses in secondary schools should be modified."[3] "Without a close cooperation between business men and commercial teachers no real progress toward the solution of the business-training problem is likely to be achieved."[4]

At present Professor Nichols is working on a thorough study of commercial arithmetic taught in the secondary schools and says he has some startling facts to reveal.

Lucien B. Kinney has an article entitled "Program for the Determination of Mathematical Requirements of Commercial Positions taken by High School Graduates", in which he outlines

1. Nichols, Frederick G.--A new Conception of Office Practice Harvard University Press, Cambridge 1927--page 24
2. Ibid page 27 3. Ibid page 28 4. Ibid page 20

a practical method of procedure in conducting an investigation.

In the Journal of Business Education, Volume VII in the February and March issues he tells minutely of a survey made for determining "Mathematical Requirements of Business positions." His survey was extensive and the findings given in table form. Many interesting facts are given and some of the facts that check with my findings are:--

1. The majority of clerical workers of both sexes are required to perform all fundamental operations
2. From 1/6 to 1/8 perform operations in decimal and common fractions
3. There is a need for drill on fundamentals and a knowledge of calculating machines[1]

The study surely shows the need of teaching business mathematics when preparing pupils for business positions.

1. Journal of Business Education March 1932--page 14

CHAPTER III

METHOD PROPOSED FOR THE SOLUTION OF PROBLEM

The method proposed for the solution of the problem was to select pupils from recent classes, interview them to find for what type of firm they work, the kind of position they hold, and the specific use they are making of arithmetic.

The general form used in making these interviews was as follows:--

1. Name
2. What year did you graduate?
3. By whom are you employed?
4. What kind of business is done by your employer?
5. What kind of position do you hold?
6. Questions to get information on arithmetic
   A. If a clerk in a store
      1. Do you make change? How?
      2. Do you measure commodities? What?
         In pints? In quarts? In pecks?
         In gallons? In bushels? In pounds?
         In ounces? In yards? In feet?
      3. Do you use division? When? How?
      4. Do you multiply? How?
         By scale
         By figuring in arithmetic
      5. Do you add? How?

6. Do you subtract? When? How?

7. Do you reckon discount?

8. Do you make out sales slips?

9. Do you use a cash register?

10. Do you verify the cash?

B. If a bookkeeper

1. Do you make change? How

2. Do you make out bills?

How do you reckon them?

Do you use denominate numbers?

Do you reckon discount?

3. Do you have charge of the cash account?

Do you prove it?

4. Do you keep a checking account?

What form checks and stubs do you use?

Do you make a reconciliation statement?

5. Do you make out deposit slips?

What form?

How do you arrange the money?

6. Do you make out notes?

How?

7. Do you reckon interest? How? By table or sixty day method?

8. What calculating machines do you use in your work?

9. Do you reckon pay-roll?

How do you obtain the record of the time a person has worked?

Do you make out a change memorandum?

Do you make out a pay-roll memorandum?

Do you fill the pay envelopes?

How do you count the money?

10. Any further use of arithmetic?

After obtaining the data from the interviews, the next step was to compile it so that the frequency of the use of the individual arithmetical processes may be procured. The most common forms of business papers should also be illustrated for they closely link up with the arithmetic taught. They are also beneficial in motivating the work because their use aids greatly in making the work true to actual business conditions.

CHAPTER IV

PLAN FOR STUDYING CONDITIONS

In the selection of former pupils to interview when making an objective community check on just what arithmetic is used, there were several underlying conditions to consider.

The group, of course, must have representatives from different types of commercial work done in business offices and banks and, too, must also have representatives from different types of business concerns operating in the community. It must contain data from employees working in offices where only one or two workers are employed and the work is diversified, as well as employees working in offices where twenty or thirty are employed and the work is highly specialized.

Besides the strictly office employees numerous clerks in chain grocery stores, department stores and Woolworth's must be included as many of the graduates of Beverly High School are employed as clerks.

The wisest method seemed to be to make a check with the aid of the alumni files and select about forty graduates, eight for each of the last five years, who were working in office positions. The clerks could be readily checked by making visits to the chain grocery stores, department stores and Woolworth's.

In order to obtain the desired data the three following

methods were used:--

1. A visit to places of business where the actual work was inspected (Used whenever possible)
2. An interview with the pupil personally out of business hours
3. Telephone conversation when pupils were not readily accessible for an interview

The first method would naturally yield most complete information about the arithmetic work done and incidentally reveal much first hand business information that would aid in teaching business subjects. Pupils are vitally interested in the actual business methods of operating companies in their own city. On making some of the interviews members of my present classes were taken so that they might report first to the classes just how office employees were handling their work in the business world.

After making the decision concerning just what pupils should be interviewed, the next logical step was to make sure that the questionaire used was revealing the pertinent facts. Several revisions were necessary before the form given in the previous chapter was completed.

Pupils and employers alike were interested and ever ready to cooperate in order to give any information that might be helpful.

CHAPTER V

POSITIONS OF FORMER PUPILS

The various types of positions held by former pupils were as follows:--

Table 1

Types of Positions Held

1.	General bookkeepers	13
2.	Combination secretary-bookkeepers	8
3.	Strictly secretarial	1
4.	Bank employees	14
5.	Cost accountant	1
6.	Billing clerks	4
7.	Pay-roll clerks	4
8.	Filling station manager	1
9.	House to house canvassers	2
10.	Sales clerks in retail stores	22
	Total	70

While there are ten headings under which practically all of the positions may be classified, all of them would fall under two main headings, namely:--office or selling positions. It is, therefore, for these two types of positions which are so dependent upon each other and for which accuracy and competency is absolutely necessary that we should train our pupils. These positions are the means of contact of the firm with the public and one error made by an employee many times creates an ill favor which causes loss of business and confidence.

Besides noting the numerous types of positions held by former pupils, it is also interesting to note the varied kind of business concerns by whom they were employed. The

list was as follows:--

Table 2

TYPES OF BUSINESS IN WHICH EMPLOYERS ENGAGE

1.	Banks		14
	a. Savings	7	
	b. National	4	
	c. Trust Company	3	
2.	Furniture		2
3.	Law		1
4.	School		2
5.	Red Cross		1
6.	Insurance		3
7.	Shoe Machinery Manufacturing		6
8.	Retail Shoe Store		1
9.	Woolworth's and Grant's		14
10.	First National and Atlantic & Pacific		5
11.	Department Store		4
12.	Plumbing		1
13.	Lunch Counter		1
14.	Filling Station		1
15.	Farm		1
16.	Credit Bureau		1
17.	Telephone and Telegraph		1
18.	Ice		1
19.	Coal and Lumber		1
20.	Gas and Electric		2
21.	Women's Dress Manufacturing		1
22.	Lithograph		1
23.	Railroad		1
24.	Mill Supplies		1
25.	Lumber		1
26.	Oil Skin Garment Manufacturing		1
27.	Automobiles		1
	Total		70

Although the list is limited it is, nevertheless, representative as it includes manufacturing, wholesale, and retail concerns as well as public utility and service companies.

CHAPTER VI

SAMPLES OF BUSINESS FORMS AND ANSWERS OBTAINED

Exhibit 1

Answers from a general office worker

1. Mary Accommando
2. Year of Graduation 1931
3. Employed by Woolworth Company
4. Retail store
5. Position held in office with part time clerical work
6. Makes change Austrian method
7. Keeps and proves cash account
8. Keeps checking account
   - Makes deposits
   - Makes out checks
   - Makes reconciliation statement at the end of the month
9. Checks invoices
   - Reckons cash discount
   - Reckons percent of gain
10. Makes daily and weekly sales reports
11. Makes pay-roll
    - Time of clerks listed
    - Makes change memorandum and pay-roll memorandum
    - Counts money and fills envelopes

Exhibit 1 (Cont.)

Answers from a general office worker

12. Fundamentals used

Adding

Subtracting

Multiplying

Dividing

13. Denominate numbers used

Pounds

Ounces

Gross

Dozen

Yards

14. Uses cash register and adding machine

Exhibit 2

Answers from a bank clerk

1. Marjorie Owen
2. Class of 1931
3. Beverly Savings Bank
4. Employed as clerk
5. Reckons time and interest from tables (Exhibits 16 and 17)
6. Makes change, Austrian method
7. Keeps daily cash book and balances it
8. Keeps checking account
9. Writes receipts

Exhibit 2 (Cont.)

Answers from a bank clerk

10. Sends dividend checks

11. Fundamentals used

Adding

Subtracting

Multiplying

Dividing

12. Uses adding machine

Exhibit 3

Answers from a sales clerk

1. Lillian Zack

2. Class of 1931

3. Employed by Almy, Bigelow and Washburn, Inc.

4. Department store

5. Reckoning and making out of sales slips

6. Keeps record of daily sales on card

7. Denominate numbers used

Yards--Measuring

Dozen--Counting

8. Makes change and verifies change from cashiers

9. Assists in inventory taking

10. Fundamentals used

Adding Subtracting

Multiplying Dividing

BUSINESS PAPERS

Exhibit 4

Deposit Slip

BEVERLY NATIONAL BANK
Beverly, Mass.
Deposited to
The credit of

_____

_____ 193____

Please List Each Check Separately

CURRENCY	
Silver	
Gold	
Checks (On Beverly (Name Banks	
Checks (Out of town (Name Place	

Exhibit 5

Check Form and Stub

No. _____ $_____
Date _____ 19
To _____
For _____

Bal. Brot. For'd	
Amt. Deposited	
Total	
Amt. this Check	
Bal Car'd For'd	

BEVERLY TRUST COMPANY 53-278/1

Beverly, Mass. _____ 19__ No. __

Pay to the order of _____ $_____

_____ Dollars

_____

Exhibit 6

Bank Statement

Statement of Account with

Name

BEVERLY TRUST COMPANY
Beverly, Mass.

for the month of December 1932

OLD BAL.	DATE	CHECKS	DATE	DEPOSITS	DATE	BALANCE
			Bal. brot. ford.			114.89
114.89	DEC 2	5.00- 9.00-	DEC 2	80.00	DEC 2	180.89
180.89	DEC 5	TX .28			DEC 5	TX 180.61
180.61	DEC 6	25.00-			Dec 6	155.61

Exhibit 7

Checking Account Reconciliation Statement

Checking Account Balance December 31, 1932	75.25
Outstanding checks	
No. 106	10.33
No. 107	55.--
No. 108	15.--
Bank Balance 12/32	155.61

Exhibit 8

Pay-roll Time Sheet

WEEKLY SALARY REPORT

For Week Ending January 14, 1933

No.	Regular Salesladies	Time M	T	W	T	F	S	Total	Rate	Amount
1	Miss Smith	8	8	0	8	8	8	40	25	10.00
2	Miss Vander	8	8	8	8	8	8	48	20	9.60
3	Miss Bryan	0	3	2	4	8	8	25	22	5.50
4	Miss Brown	8	8	8	8	8	8	48	30	14.40
5	Miss Dyke	8	8	8	8	8	8	48	25	12.00
										51.50

Exhibit 9

Change Memorandum

Number	20's	10's	5's	2's	1's	50¢	25¢	10¢	5¢	1¢
1		1								
2			1	2		1		1		
3			1			1				
4		1		2			1	1	1	
5		1		1						
		3	2	5		2	1	2	1	

Exhibit 10

Pay-roll Memorandum

MEMORANDUM

Cash for Pay Roll

for

_____

_____ 19___

Twenties,			
Tens,	3	30	--
Fives,	2	10	--
Twos,	5	10	--
Ones,			
Halves,	2	1	--
Quarters,	1		25
Dimes,	2		20
Nickels,	1		05
Pennies,			
		51.	50

Exhibit 11

FORM OF BILL

UNITED SHOE MACHINERY CORPORATION

140 Federal Street

Boston, Mass.

December 12, 1932 — Weyenberg Shoe Mfg. Co.

Mil 9169 24735E — 301 N. Brown Street

Milwaukee, Wisc.

Your Order No.						
HAWKINS 3027	2 720 IDEAL CLICKING--C3 70	7	40			
	60%	4	44			
		2	96			
	POSTAGE & INSURANCE		32		3	28
	This bill is due and payable NET on last day of next month. 2% Discount if paid on or before the 15th.					

Exhibit 12

SALES REPORT

Return to
BOSTON OFFICE

STORE NO. _____

SALES REPORT

	DATE	1931	1932	%INC
Day	11-1	$ 975.00	$ 995.00	2.5%
Week	11-1	$ 2660.50	$ 2750.25	3.3%

Remarks _____

Manager _____

Exhibit 13

FOREIGN INVOICE

FOREIGN INVOICE Page No._____

UNITED SHOE MACHINERY CORPORATION
140 Federal Street Boston, Massachusetts

United Shoe Machinery Company, d'Italia, Dr.,
Milan, Italy

CLASS S

Via S. S. December 5, 1932 Shipped to MILAN

Subject to all the terms and conditions of any agreements or licenses between said parties.

OUR ORDER NUMBER			PRICE EACH		
A33585 COMP 1st	11-17-32	4975x			
		FOR CONS HAND METHOD			
		LASTING MCH FOR WELT WORK			
		4 E72	18	72	
		FOR GDYR STITCH SEPARATOR MOD B			
		1 43A		22	
		FOR ECONOMY INSOLE REIN-FORCING MACHINE MODEL B			
		2 620 KZG	25	50	
		FOR ECONOMY INSOLE CHAN-NELING MODEL B			
		2 322	90	1 80	
				3 24	
		PACKING		08	3 32
A33574 COMP 1st	11-15-32	STANDARDIZED PARTS			
		3 503- SL	13	39	
		4 1536	10	40	
				79	
		PACKING		02	81
		BOXING 4975x		35	
		PACKING		01	36
		POSTAGE			48
					4 97

Exhibit 14

MONTHLY STATEMENT

(GRADED COMMISSION)

IN ACCOUNT WITH
ROCHESTER AMERICAN
INSURANCE COMPANY
NEW YORK
ONE LIBERTY STREET, NEW YORK

_____Agent at_____

Month of_____193__

COMMISSIONS (COMPUTED ON GROSS PREMS.)				
58	76	@15%	8	81
		@20%		
183	10	25%	45	78
241	86	TOTAL	54	59
RETURN COMMISSIONS				
	90	@15%		14
		20%		
3	88	25%		97
4	78	TOTAL	1	11

SUMMARY

DEBIT AGENT			CREDIT AGENT		
Gross Premiums	241.86		Com. on Gross Premiums	54 59	
Return Premiums	4 78		Com. on Ret. Premiums	1 11	
Re-insurance			Com. on Re-insurance		
Net Premiums		237 08	Net Commission		5[illegible] 48
Balance Due Agent			Balance Due Company		183 60
TOTAL		237 08	TOTAL		237 08

Exhibit 15

REPORT OF CASH

DAILY REPORT OF CASH

DAY Monday DATE November 1, 1932

RECEIPTS

Cash on hand in morning			500.00
Sales per cash reg. reading		800.00	
Less cash registers short		.25	
Balance		799.75	
Add cash registers over		1.25	
Sales per cash collections		801.00	
Less office cash short---			
Less refunds	4.00	4.00	
		797.00	
Add office cash over		------	
Add clerk's purchases		1.50	
Add meals Dept.34 help		5.00	
Add C. O. D. accounts		25.00	
Add Mdse for store use		1.25	
Total		829.75	
Add 100% weigh. Mach. receipts		18.50	
Net Sales for the day			848.75
Total			1348.75

DISBURSEMENTS

Cash on hand in evening	451.13
Deposited in bank (attach receipt-(ed deposit slip	565.00
Salaries	300.00
Manager Drew (name)	30.00
Freight and Expressage	2.62
Total	1348.75

EXHIBIT 16

Table for finding time on loans

TABLE OF DAYS--FIRST YEAR
(360 day basis)
For use in figuring policy loan interest

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	31	61	91	121	151	181	211	241	271	301	331
2	32	62	92	122	152	182	212	242	272	302	332
3	33	63	93	123	153	183	213	243	273	303	333
4	34	64	94	124	154	184	214	244	274	304	334
5	35	65	95	125	155	185	215	245	275	305	335
6	36	66	96	126	156	186	216	246	276	306	336
7	37	67	97	127	157	187	217	247	277	307	337
8	38	68	98	128	158	188	218	248	278	308	338
9	39	69	99	129	159	189	219	249	279	309	339
10	40	70	100	130	160	190	220	250	280	310	340
11	41	71	101	131	161	191	221	251	281	311	341
12	42	72	102	132	162	192	222	252	282	312	342
13	43	73	103	133	163	193	223	253	283	313	343
14	44	74	104	134	164	194	224	254	284	314	344
15	45	75	105	135	165	195	225	255	285	315	345
16	46	76	106	136	166	196	226	256	286	316	346
17	47	77	107	137	167	197	227	257	287	317	347
18	48	78	108	138	168	198	228	258	288	318	348
19	49	79	109	139	169	199	229	259	289	319	349
20	50	80	110	140	170	200	230	260	290	320	350
21	51	81	111	141	171	201	231	261	291	321	351
22	52	82	112	142	172	202	232	262	292	322	352
23	53	83	113	143	173	203	233	263	293	323	353
24	54	84	114	144	174	204	234	264	294	324	354
25	55	85	115	145	175	205	235	265	295	325	355
26	56	86	116	146	176	206	236	266	296	326	356
27	57	87	117	147	177	207	237	267	297	327	357
28	58	88	118	148	178	208	238	268	298	328	358
29	59	89	119	149	179	209	239	269	299	329	359
30	60	90	120	150	180	210	240	270	300	330	360

If the period under consideration carries over into the next calendar year, add 360 to the figure obtained for the end of the period and deduct that for the beginning of the period.

EXHIBIT 17

Table for Interest on $1000 at 5%

Days	Int.						
1	.139	46	6.389	91	12.639	136	18.889
2	.278	47	6.528	92	12.778	137	19.028
3	.417	48	6.667	93	12.917	138	19.167
4	.556	49	6.806	94	13.056	139	19.306
5	.694	50	6.944	95	13.194	140	19.444
6	.833	51	7.083	96	13.333	141	19.583
7	.972	52	7.222	97	13.472	142	19.722
8	1.111	53	7.361	98	13.611	143	19.861
9	1.250	54	7.500	99	13.750	144	20.000
10	1.389	55	7.639	100	13.889	145	20.139
11	1.528	56	7.778	101	14.028	146	20.278
12	1.667	57	7.917	102	14.167	147	20.417
13	1.806	58	8.056	103	14.308	148	20.556
14	1.944	59	8.194	104	14.444	149	20.694
15	2.083	60	8.333	105	14.583	150	20.833
16	2.222	61	8.472	106	14.722	151	20.972
17	2.361	62	8.611	107	14.861	152	21.111
18	2.500	63	8.750	108	15.000	153	21.250
19	2.639	64	8.889	109	15.139	154	21.389
20	2.778	65	9.028	110	15.278	155	21.528
21	2.917	66	9.167	111	15.417	156	21.667
22	3.056	67	9.306	112	15.556	157	21.806
23	3.194	68	9.444	113	15.694	158	21.944
24	3.333	69	9.583	114	15.833	159	22.083
25	3.472	70	9.722	115	15.972	160	22.222
26	3.611	71	9.861	116	16.111	161	22.361
27	3.750	72	10.000	117	16.250	162	22.500
28	3.889	73	10.139	118	16.389	163	22.639
29	4.028	74	10.278	119	16.528	164	22.778
30	4.167	75	10.417	120	16.667	165	22.917
31	4.306	76	10.556	121	16.806	166	23.056
32	4.444	77	10.694	122	16.944	167	23.194
33	4.583	78	10.833	123	17.083	168	23.333
34	4.722	79	10.972	124	17.222	169	23.472
35	4.861	80	11.111	125	17.361	170	23.611
36	5.000	81	11.250	126	17.500	171	23.750
37	5.139	82	11.389	127	17.639	172	23.889
38	5.278	83	11.528	128	17.778	173	24.028
39	5.417	84	11.667	129	17.917	174	24.167
40	5.556	85	11.806	130	18.056	175	24.306
41	5.694	86	11.944	131	18.194	176	24.444
42	5.833	87	12.083	132	18.333	177	24.583
43	5.972	88	12.222	133	18.472	178	24.722
44	6.111	89	12.361	134	18.611	179	24.861
45	6.250	90	12.500	135	18.750	180	25.000

EXHIBIT 17 (Cont.)

Table for Interest on $1000 at 5%

Days	Int.						
181	25.139	226	31.389	271	37.639	316	43.889
182	25.278	227	31.528	272	37.778	317	44.028
183	25.417	228	31.667	273	37.917	318	44.167
184	25.556	229	31.806	274	38.056	319	44.306
185	25.694	230	31.044	275	38.194	320	44.444
186	25.833	231	32.083	276	38.333	321	44.583
187	25.972	232	32.222	277	38.472	322	44.722
188	26.111	233	32.361	278	38.611	323	44.861
189	26.250	234	32.500	279	38.750	324	45.000
190	26.389	235	32.639	280	38.889	325	45.139
191	26.528	236	32.778	281	39.028	326	45.278
192	26.667	237	32.917	282	39.167	327	45.417
193	26.806	238	33.056	283	39.306	328	45.556
194	26.944	239	33.194	284	39.444	329	45.694
195	27.083	240	33.333	285	39.583	330	45.833
196	27.222	241	33.472	286	39.722	331	45.972
197	27.361	242	33.611	287	39.861	332	46.111
198	27.500	243	33.750	288	40.000	333	46.250
199	27.639	244	33.889	289	40.139	334	46.389
200	27.778	245	34.028	290	40.278	335	46.528
201	27.917	246	34.167	291	40.417	336	46.667
202	28.056	247	34.306	292	40.556	337	46.806
203	28.194	248	34.444	293	40.694	338	46.944
204	28.333	249	34.583	294	40.833	339	47.083
205	28.472	250	34.722	295	40.972	340	47.222
206	28.611	251	34.861	296	41.111	341	47.361
207	28.750	252	35.000	297	41.250	342	47.500
208	28.889	253	35.139	298	41.389	343	47.639
209	29.028	254	35.278	299	41.528	344	47.778
210	29.167	255	35.417	300	41.667	345	47.917
211	29.306	256	35.556	301	41.806	346	48.056
212	29.444	257	35.694	302	41.944	347	48.194
213	29.583	258	35.833	303	42.083	348	48.333
214	29.722	259	35.972	304	42.222	349	48.472
215	29.861	260	36.111	305	42.361	350	48.611
216	30.000	261	36.250	306	42.500	351	48.750
217	30.139	262	36.389	307	42.639	352	48.889
218	30.278	263	36.528	308	42.778	353	49.028
219	30.417	264	36.667	309	42.917	354	49.167
220	30.556	265	36.806	310	43.056	355	49.306
221	30.694	266	36.944	311	43.194	356	49.444
222	30.833	267	37.083	312	43.333	357	49.583
223	30.972	268	37.222	313	43.472	358	49.722
224	31.111	269	37.361	314	43.611	359	49.861
225	31.250	270	37.500	315	43.750	360	50.000

EXAMPLE ILLUSTRATING THE USE OF THE TWO PREVIOUS TABLES

Annuity Date	Date of Loan	Amount
June 7	November 17	$13.00

360

157 June 7

517

317 November 17

200 days

27.778 x .013 = $.36 Interest for 200 days

This problem shows the use of the table when the consideration carries over into the next calendar year. When the period is in the same year the time is found by subtracting the numbers of the two dates.

EXHIBIT 18

BEVERLY MINIMUM RATES		Page from Insurance Tariff Rate COMBUSTIBLE ROOF		
		1 Yr.	3 Yr.	5 Yr.
Dwellings, with not more than one apartment:				
Brick.	Building.....	.17	.42	.68
	Contents.....	.22	.55	.88
Frame.	Building.....	.21	.52	.84
	Contents.....	.26	.65	1.04
Dwellings, with not more than two apartments:				
Brick.	Building.....	.19	.47	.76
	Contents.....	.24	.60	.96
Frame.	Building.....	.23	.57	.92
	Contents.....	.28	.70	1.12
Apartment Houses and Dwellings in rows without "division walls" with 3 or 4 apartments:				
Brick.	Building.....	.24	.60	.96
	Contents.....	.29	.72	1.16
Frame.	Building.....	.35	.87	1.40
	Contents.....	.40	1.00	1.60
With 5 to 8 apartments, inclusive				
Brick.	Building.....	.28	.70	1.12
	Contents.....	.33	.82	1.32
Frame.	Building.....	.48	1.20	1.92
	Contents.....	.53	1.32	2.12
With 9 to 12 apartments, inclusive				
Brick.	Building.....	.34	.85	1.36
	Contents.....	.39	.97	1.56
Frame.	Building.....	.58	1.45	2.32
	Contents.....	.63	1.57	2.52
Garages, private, not over 1 story in height, without basement or loft:				
Brick.	Building.....	.17	.42	.68
	Contents.....	.22	.55	.88
Frame.	Building.....	.21	.52	.84
	Contents.....	.26	.65	1.04
Barns or Stables Garages, private, with basement or over 1 story in height; Outbuildings, etc.:				
Brick.	Building.....	.35	.87	1.40
	Contents.....	.40	1.00	1.60
Frame.	Building.....	.40	1.00	1.60
	Contents.....	.45	1.12	1.80

Rates effective July 1, 1932 on $100.--

EXPLANATION OF EXHIBITS

Exhibits 1, 2, and 3 are typical results gained from interviews with former students. A general office worker's, a bank clerk's, and a sales clerk's answers have been selected to show the work done in each of these groups.

Exhibit 1 shows, as one would naturally expect, more diversified work done as the student interviewed is a general office worker. The forms she uses in her work are similar to Exhibits 4, 5, 6, and 7 for checking account; 8, 9, and 10 forms are used for Pay Roll; Exhibit 15 is used in making a daily report of cash; 11 and 12 forms are used in making bills and a comparative sales report.

Exhibit 2 shows work done by a bank clerk. Her work is more specialized as she does the work typical to bank clerks. She uses forms in Exhibits 4, 5, 6, and 7 in the checking account; the table in Exhibit 16 for finding time on loans, and the table in Exhibit 17 for finding interest.

Exhibit 3 shows answers gained from an interview with a department store clerk. Her work is highly specialized and the arithmetic used is mostly fundamentals in which the numbers are seldom larger than three digits.

Exhibits 4, 5, 6, and 7 are in general used in keeping checking accounts. Most employees use all four, but occasionally a clerk has the work of making out forms similar to Exhibit 5 only.

Exhibits 8, 9, and 10 are typical forms for pay rolls. There is some variance from Exhibit 8 as the pay is based on piece work. Exhibits 9 and 10 are the same regardless of Exhibit 8.

Exhibits 11 and 13 are invoices used in a wholesale manufacturing plant. They follow general bill forms.

Exhibits 14 and 18 are forms used in the insurance business. Exhibit 14 shows a statement sent by a local insurance company to the insurance company for whom they are agents. Exhibit 18 shows a page from a tariff rate book used to reckon bills.

Exhibit 15 is used to prove and report cash daily in a department store.

Exhibits 16 and 17 are used for reckoning time and interest. The method used is fully explained on page 24. Although the same tables were not used by all the bank clerks interviewed the others used were similar.

The amounts and names given in filling out these forms are for the most part not taken from actual transactions as they were used simply to show the proper method of inserting data.

CHAPTER VII

ARITHMETIC USED

The different topics of arithmetic used by the former pupils whom I interviewed were as follows:--

1. Making change

   (The average denomination of money given to be changed is a one-dollar bill)

   a. Austrian method of making change

      For example, when a customer makes a purchase of $1.32, and gives a two-dollar bill in payment, how much change should he receive?

      The clerk will return to the customer 3 cents, a five-cent piece, a ten-cent piece, and a half dollar. He says as he hands them. "$1.32, 35, 40, 50, $2.00." which means that 3 cents added to $1.32 equals $1.35; $1.35 plus $.05 equals $1.40; $1.40 plus $.10 equals $1.50; and $1.50 plus $.50 equals $2.00

   b. Automatic cashiers

      Change is sorted and placed in machine. There are three different sets of keys, one colored blue which is used when making change for a quarter, one red which is used when making change for a

b. Automatic cashiers (Continued)

half-dollar, and one set black which is used for making change for a dollar. The denomination for the amount of the purchase is printed on the keys. The operator presses the key that has the amount of the purchase printed on it, then the correct change is automatically released.

For example, the change given is a quarter and the purchase is ten cents; the operator presses a blue key with the amount 10 on it and a nickle and a dime is released.

2. Billing

See exhibits 11 and 13, pages 19 and 20 for examples of average bills.

3. Keeping a checking account

a. Making checks

b. Making deposits

The amount of money deposited in cash and in checks by business firms is about equal. Here is a typical deposit slip:

b. Making deposits (Continued)

BEVERLY NATIONAL BANK
Beverly, Mass.

Deposited to
The credit of

George Smith

April 14, 1933

Please List Each Check Separately		
Currency	18	00
Silver	4	50
Check 53-278	25	00
	47	50

c. Verifying bank balance and check-book balance

See exhibits 6 and 7, page 16 for example.

4. Cash account

Cash receipts on the left page and cash payments on the right. The balance is obtained by adding the left columns and the right colum, then finding the difference. The average length of a cash account is 25 items, on the side which makes it necessary to foot the book and carry the totals to the next pages.

5. Reckoning interest

a. By use of tables

See exhibits 16, 17, and the illustration on page 26.

5. Reckoning interest (Continued)

b. By 60-day method

For example, find the interest on $360 for

3 mo. 17 da. at 6%

$3.60 for 2 mo.
1.80 for 1 mo.
.90 for 15 da.
.12 for 2 da.
6.42 for 3 mo. 17 da. at 6%

Interest for 60 days or 2 months is found by pointing off 2 places in the principal, which gives $3.60. 1 mo. is $\frac{1}{2}$ of 60 da., 15 da. is $\frac{1}{4}$ of 60 da. Point off 3 places in the principal for 6 da. which gives $.36 and take 1/3 of it for 2 da. The total is $6.42

6. Insurance

a. Making bills from tariff books

See exhibit 18, page 27.

For example, a brick single dwelling worth $5000 with a combustible roof is insured for 3 years.

The premium is found by multiplying 50 by $.42, the rate on $100. The answer is $21.

6. Insurance (Continued)

b. Cancelling of policies

1. If policies are cancelled and new ones taken in the same company, then the fraction of the premium refunded is in exact proportion as the unexpired time is to the original time of the policy.

For example, if the premium is $30 for three years and the policy was cancelled one year before it expired, the rebate would be $10.

2. If policies are cancelled and no others are taken, then there is a larger percent charged for the time that the policies have run than the proportion to the whole term of the policy.

For example, the premium on a five year policy is $50. It is cancelled at the end of eight months. 20% of the total premium is charged for the time the policy has run. The rebate would then be 80% of the whole amount or $40.00.

7. Discount

a. Bank discount

For example, find the proceeds of a 90-da. note for $3800 dated June 4, 1932, if discounted July 2, 1932 at 6%.

September 2 date due

Term of discount 62 da.
(From July 2 to September 2)

$39.27 discount for 62 days

$3800 less $39.27 equals $3760.73

b. Cash discount

For example, terms 2/10, in n/30 means that the buyer, if he pays within ten days from the date on the bill may deduct 2% of the amount of the bill; 30 days net, means total amount is due in 30 days.

Cash discount range from 2% to 8%, but the average is 3%

c. Trade discount

Manufacturers, wholesalers, and jobbers issue catalogues containing prices of articles and instead of issuing a new catalogue if there is a change in price they simply change the discount allowed.

c. Trade discount (Continued)

Often there is a series of discounts allowed.

The average number of trade discounts allowed in a series was two.

For example, the trade discounts allowed are 20% and 10% on $550. Find single rate of discount as follows:

	100% is marked price
	- 20%
	80%
10% of 80% is	- 8%
	72% is net price

100% - 72% is 28% single rate of discount

	$550 marked price
28% of $550 is	154
	396

8. Pay Roll

See exhibits 8, 9, and 10, pages 17 and 18.

9. Average

e. g. Average daily sales

Monday	$432.89
Tuesday	326.64
Wednesday	243.90
Thursday	357.45
Friday	238.79
Saturday	652.37
	2253.04

$2253.04 - 6 $375.51

10. Percent of increase and decrease

See exhibit 12, page 19.

11. Marking price in code

Only cost price was marked in code

Example:

Code	E	D	U	C	A	T	I	O	N	R
	1	2	3	4	5	6	7	8	9	0

Repeater X

Price $2.33 D.UX

12. Denominate numbers

Names only used. For example, 6 quarts of milk, 1 pint of cream, 10 pounds of sugar, 5 yards of cloth. Sales clerks do not change numbers to higher or lower denominations.

13. Practical measurements

Board feet problems were the only ones used.

e. g. 30 pcs., 3" x 8" x 12' at $35. per M

$$\frac{30 \times 3 \times 8 \times 12}{12} \quad 720 \text{ bd. ft.}$$

$$.720 \times 34 \quad \$25.20$$

14. Gas and electric meters

Figures from meter readers used to make out bills.

15. Slide rule

Only one person used this method of calculating.

16. Stocks and bonds

Banks acted as agents for customers for buying and selling of stocks and bonds through brokers.

16. Stocks and bonds (Continued)

For example, when a bank purchases stock for a customer a statement is sent out as follows:--

One share General Motors @	$25.50
Plus Commision	2.00
Amount of charge	$27.50

17. Four fundamentals

a. Adding

Written or mental — Used by 69 of the 70

Machine — 29 of the 70

Average number to be added 3 digits and average length of columns 10 figures

b. Multiplying — Used by 68 of the 70

Average size of the numbers 2 or 3 digits

c. Subtracting — Used by 68 of the 70

Average size of the numbers 3 digits

d. Dividing — Used by 68 of the 70

Divisor averaged figures of 1 or 2 digits

Dividend averaged figures of 3 or 4 digits

Table 3

SUMMARY OF PROCESSES AND RELATIVE FREQUENCY

Definite frequency count is not possible due to method of gathering the data, but the table below is submitted as estimate, based upon my best judgment all things considered.

	Process	Number of the 70 who use	Relative Frequency on basis of 1000 (Estimated)
1.	Addition	69	950
2.	Multiplication	68	700
3.	Subtraction	68	625
4.	Division	68	515
5.	Making change	56	450
6.	Billing	26	300
7.	Keeping check book	24	210
8.	Denominate numbers (Names only)	23	80
9.	Cash account	19	170
10.	Reckoning interest	18	80
11.	Discount	13	40
12.	Stocks and Bonds	8	18
13.	Pay roll	6	30
14.	Average	4	15
15.	Marking price in code	3	4
16.	Insurance	3	20
17.	Gas and electric meters	2	6
18.	Percent increase and decrease	2	1
19.	Practical measurements	1	5
20.	Slide Rule	1	9

CHAPTER VIII

Conclusions to the Study

The study reveals the following facts:--

1. Commercial arithmetic should still be taught because most all pupils who have graduated from the commercial course are using some form of arithmetic in their work.
2. Drill on fundamentals for speed and accuracy is necessary.
3. Use of calculating machines should be included in the commercial course.
4. Much of the arithmetic work is linked with the use of business papers so pupils should be taught familiarity with them.

In summing up the value of this study, I would say that the contribution to the whole field of commercial arithmetic may not be of vast importance, but to me as a teacher in Beverly it has given a practical view of the type of positions my pupils are in all probability to secure. It has also given me definite goals for which to work.

The pupils have always been vitally interested in my experiences when employed as a sales clerk, a bank clerk, and a government worker, so the added first hand

information that I have obtained will enable me to tell the pupils just how the work is done in local concerns where many of their relatives are employed.

My work in commercial arithmetic should be thoroughly motivated and more practical than in previous years.

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2. The preliminary period
3. The Presentation
4. Application
5. The Pupil Problem

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Guiler, Walter S.--Objectives and Activities in Arithmetic Rand McNally Company--New York--1926 Pages 3-122

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A combination of time allowed for commercial arithmetic and bookkeeping, for the instruction of both bookkeeping and arithmetic.
The teaching of arithmetic in conjunction with bookkeeping will destroy the monotony of arithmetical drill.

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For summary see page 4 of thesis

Kinney, Lucien B.--Research Studies of Commercial Education
Bulletin III University of Iowa, Nov. 1 '28
Pages 60-75

Article shows how to conduct a study and form a questionaire

Louthe, Mary--Units of Measurement in Industry
B. U. Graduate School Masters' Thesis 1931
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1. Not profitable for children in the elementary grades to spend time committing to memory tables of weights and measures.

2. Teaching of addition, subtraction, multiplication and division of compound denominate numbers has no value in industry.

3. Reduction ascending and reduction descending has no value in industry with perhaps the exception of the estimating department.

Moore, John H. and Miner, George W.--Practical Business Arithmetic. Ginn & Co., Boston--1916 1-448

Text Book for Commercial Arithmetic

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Graduate School of Education, Harvard University
Number XII, Harvard University Press, Cambridge
1927 Pages 5-123

Pyle, Wm. H.--Psychology of Learning--Warwick & York, Inc., Baltimore--1928 Pages 1-380

The author states in the preface that he has tried to state every thing that is known about learning.

For comment see page 3 of the thesis

Sala, Vincent--Denominate Numbers Used in the Factories of New Britain--B. U. School of Education Masters' Thesis 1931 Pages 1-80

Out of 67 units of 11 tables only 18 used

Over 61% of persons did not need or use any unit of measurements.

A table is never used in entirety

Inch and pound are the most frequent

Schaaf, William L.--Progressive Business Arithmetic D. C. Heath, Boston 1930 Pages 1-426

Text. Arithmetic material is developed and presented as far as possible in a "psychological order" instead of the so-called "logical order"

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Objects

1. Training that leads to facility and accuracy in handling the fundamentals in arithmetic.

2. Emphasis on the fundamental principles or arithmetic rather that on set rules for solution of problem.

3. Clearness and fulness of explanation

4. Problems that have an informational value.

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"The aim of this work is, therefore, to assemble and interpret the scientific data as to what is useful in arithmetic, and to give help in organizing for the schools the new and vital arithmetic demanded by these studies in the interests of a happier childhood and a more effective tool for adulthood."