A STUDY TO DETERMINE A SOUND SOLUTION FOR THE EDUCATIONAL PRINT SHOP WITH REGARD TO WHAT ACTION SHOULD BE TAKEN BY HIGH SCHOOLS AND COLLEGES IN THE MATTER OF EQUIPMENT FOR OFFSET AND LETTERPRESS PRINTING

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THESIS

Presented to the Graduate Council of the North Texas State College in Partial Fulfillment of the Requirements

For the Degree of

MASTER OF SCIENCE

By

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Huntsville, Texas

August, 1949
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CHAPTER I

LETTERPRESS VERSUS OFFSET PRINTING FOR THE FUTURE

Statement of the Problem

This is a study to determine the present and future status of offset printing as compared to letterpress printing in Texas, based on the opinions of qualified teachers of printing and commercial printers taken from sixteen groups of different sizes.

Introduction to the Problem

During the past twenty years printing departments in colleges, high schools, trade schools and commercial shops have been undergoing drastic changes in equipping their shops with new equipment of all kinds. Up to the time of the United States' entry into World War II, manufacturers of printing equipment declared that their sales of these products were growing into boom proportions. With the freezing of all new printing machinery and equipment by the government, old machinery breaking down and not being repaired because of parts being unavailable, these institutions and establishments continued with what they had and did a relatively good job in teaching printing and in producing printing that was only slightly below average.

However, during this period when buying of equipment was lying dormant, educators in the printing field and print shop
owners were concerned with a fairly recent invention of a new phase of printing. When used on certain kinds of jobs, especially in the pictorial field and in making many thousands of impressions, this new process has cut down the cost of printing, in many cases, to nearly four fifths of the amount of the old methods of printing. This new method is called offset, which is so-called because it does not print directly from the plate or type itself. Instead, the plate picture is transferred to a rubber roller as the roller comes in contact with the plate, and when the paper in turn comes in contact with the rubber roller, the picture offsets on the paper. Some printers estimate this new method to be not only cheaper, but in working against time, it is days faster than the old method because the presses come equipped with a camera for making pictures and with plate-making device. These presses can be bought in different sizes with one color, two colors, and four colors.

Some of the questions that are still in the minds of all in the printing field are: How far can we go in offset? Would it be to the best advantage to go offset altogether? Can everything be printed by the new process? Should we provide two processes that we will be able to choose from in printing different jobs? Will it be profitable to have our newspapers printed by offset? Just how far can we expect to go in one or the other process?
Will offset take the place of letterpress or will one process supplement the other?

Previous Research

Since the process of offset is a comparatively new one, little research has as yet been done along this line, and this is the first pioneer in the field. However, American Type Founders, Elizabeth, New Jersey, made a survey in "Use of Offset and Letterpress by 468 Buyers of Printing."¹ Another survey was made by General Printing Ink Corporation based on replies received from 116 firms buying printing in Metropolitan New York, representative of eighty-six industries. The question asked by this survey was: "What processes of printing do you generally employ?"²

Need for the Study

In 1942 in the city of Hot Springs, Arkansas, the writer went before members of the local typographical union for the purpose of obtaining their permission to give one year union apprentice credit to high school students having had four years of experience in the high school printing department. At this

¹American Type Founders, Advertising Material.

²General Printing Ink Corporation, Advertising Matter.
time, one of the issues that came up in the words of the spokesman was: "What is the use of teaching a boy a trade that will become obsolete in the course of his lifetime?" The speaker went on to say that a new process in printing, called "offset" printing, had been developed which some time in the near future would take the place of the "letterpress" method which had been used in theory ever since Gutenberg invented his "movable type". This theory was discussed at that time by all present, with part of the group denying the possibility of such a change and others agreeing that it could happen, but no conclusion was reached before the meeting adjourned.

In the years that have passed, nothing of an astounding nature has come to light in either field. However, the offset process has gained much recognition in these years with more and more converts to the offset principle being made each month.

At the end of World War II printers purchased as much printing equipment of all kinds as they could, without checking either the type or the kind of machinery. They had done without for so many years that they took anything they could get delivered to their floors. Consequently, this buying of equipment has resulted in the greatest period of expansion in the printing field that the United States and the world has ever known.
Since, however, the race for buying equipment has ended, teachers of printing and small commercial printing shops are doing some serious thinking about the future of offset and trying to decide if they can combine it with their letterpress setup to the advantage of both processes. Qualified teachers of printing can see the advantages of having offset in their printing system, but would like to know to a reasonable extent, if it would be profitable to expand their shops to include it and to what extent should they expand.

This study should also be a help toward guiding the student and printing apprentice into the right fields according to his talents with an attempt toward establishing a future in his occupation that will not be replaced by some other process in the course of his life span.

This study is intended to determine whether offset will take the place of letterpress or if one process will supplement the other.

Method of Procedure

In determining what method of procedure to follow, consideration was given to two ways of arriving at conclusions: (1) by personal interviews; (2) by sending out questionnaires. Since
the subjects of the interviews were separated by long distances, too much time and money would have been necessary to cover the desired territory. Therefore, the writer decided to use the questionnaire method of procuring the facts, to limit the field of research to Texas, and to send questionnaires to both schools and commercial firms.

With these things in mind, a set of questions was made, being designed specifically to interest the teacher of printing. Since the teacher of printing would also be interested in a printer's problems, thirty-five questions were made out and were arranged in logical groups, starting with what type of school they represented and ending with asking their opinion regarding the possibilities of one process taking the place of the other in future years.

The questionnaire for the commercial field was similar in some respects, but had only twenty-six questions, which were arranged in groups according to relative content.

For other references, letters were written to the United States Department of Education, the United States Office of Printing and the Texas Department of Education. A double post card, mimeographed with a simple questionnaire, (attached to the inquiry,) was mailed to all junior and senior colleges in
the United States to see whether or not previous research, or related research, had been done in this field.

A mailing list for the questionnaire was secured from a 1947 edition of *Dun and Bradstreet*. The subjects were arranged in groups, one through four, according to the valuation of their plant and the credit rating that was given them by *Dun and Bradstreet*. They were also classed in seventeen classifications: Group I--Aα, A-, A, B-, B, C-; Group II--C, D-, D, E; Group III--F, G, H, J; Group IV--K, L, M. The entire book was searched for names and when it had been entirely covered, it was found to contain approximately one thousand names. The symbol that identified printers, engravers, office supply establishments, stationers, offset lithographers, etc. was the symbol . These names were also listed under towns arranged in alphabetical order, from which the addresses were taken.

In selecting names for the distribution of the questionnaires, each group was counted for the total number and one fourth of this entire group was picked at random, an attempt being made to pick printing establishments and job shops according to size and from all parts of the state so that no locality would receive all the questionnaires.
In using an edition of *Dun and Bradstreet* that was two years old, naturally 40 of the establishments were out of business. Enclosed in the envelope sent to each participant was a letter asking for his co-operation in filling out the forms, a questionnaire, and a self-addressed envelope, stamped for his convenience.

Of the first questionnaires sent out, which totaled one hundred eighty-three, seventy were returned filled out. Thirty subjects returned the form with varied reasons why they had not been completed.

Since this number was deemed to be inadequate, another letter was written to the firms which had not returned their forms, explaining to them the importance attached to their returning the questionnaire. One hundred and fifty copies of this letter were sent out, complete with questionnaire and self addressed, stamped envelope.

When the total number was counted again, one hundred and sixteen questionnaires had been returned.

Fourteen questionnaires were mailed to colleges, trade schools, and high schools, of which number eleven were returned. Two out of the schools did not return their questionnaires be-
cause their print shop was closed; one school did not answer in any manner.

Delimitations of This Study

This study was limited in its scope by participants not returning their questionnaire. Another thing that impedes the progress of this study was the fact that participants did not answer all the questions asked.

The printing industry in this country is so large that even a sampling would have taken too much time and money. Therefore it was necessary to take a sampling only in Texas. The results of this questionnaire cannot be all-conclusive for the reason that the opinions of Texans may not be as educated on the offset setup as those in different parts of the United States.

The process of offset, although quite a few decades old, is something that the small town printer does not know much about with the result that he will not be able to answer all the questions coherently. He knows that there are two processes, but since he has had no reason from a business requirement standpoint to look into the offset benefits, he is not fully qualified to answer the questions. For this reason the conclusions that were drawn may be slightly off focus from the real picture.
Another thing that limited this study was the fact that since there had been no actual research in these two fields, a study had to be made of the biased opinions of those writers who have written articles favoring one of these processes. The time when these articles were written and whether they were written from experience or surmise had to be considered. In drawing conclusions from these articles, care was taken that an over-all account was given so that a conclusion as true as possible might be reached.
CHAPTER II

DATA REGARDING PROCESSES

There are many ways of arriving at a conclusion as to which process should be used when figuring a job to be printed. In a piece of advertising published by the Harris Machinery Company\(^3\) some criteria are listed which should be taken into consideration before a job is printed, on a letterpress or an offset press. A good finished product must be the result which fits the merchandising need and at the same time saves money.

The following points should be considered on each media when the art work and the copy come to the printer.

1. Use of the media--A printer should try to find out the how, why, and wherefore of its purpose; who will read it; how long it will take, etc.

2. The service needed--production time allowed.

3. Nature of the art work--angle of color, halftone, line drawing, etc.

4. Paper stock--quality, finish and weight to do job.

5. The quantity--small, medium or large quantity.

6. Any special conditions which definitely designate one

\(^3\)Harris Machinery Company, Your Next Move, Advertisement.
of the processes (letterpress or offset)—is it a book which
will be printed from type and kept standing for re-runs? Are
there any illustrations for which we have plates on hand? Such
special conditions naturally decide letterpress and other proc-
esses do not have to be considered. Offset may be selected
because of special conditions such as size, mounting opera-
tions, quick delivery, etc.

7. Price—although it is listed last, the price must al-
ways be strongly considered in line with quality and delivery.

With all of these different things to consider it is still
not an easy job to pick the best process to use. Irwin Woodman
says:

There is no "best" process for all types of printed jobs.
Both letterpress and offset have their strong and their
weak points, and both of the processes are better when
working together harmoniously.

.....the letterpress is a direct mechanical process and off-
set relies chiefly on chemical formulas and controls for
its success.

The essential difference between these two processes of
printing lies in the fact that while the letterpress proc-
ess is a relief process printing from hard metal direct to
the paper, offset transfers its image to a rubber blanket
first and then onto the paper. Now, how does this affect
the printed job? What are the advantages and disadvan-
tages and what is the difference in results?

In offset, because we are actually printing from the rubber
blanket instead of from a hard metal plate, we get a certain
soft effect unlike anything that can be done letterpress. This effect is obtained by much the same method as a rubber stamp just barely touching the paper. It enables us to take a fine illustration and print it on a coarse paper. Letterpress must depend on a great amount of squeeze to force the ink from the hard metal to the paper. If we were to use a fine illustration on rough paper in letterpress, this squeeze would appear. On the other hand, if a fine coated enamel were used and if our illustration contained strong highlights, I believe we would have a truer reproduction by the letterpress method.

Letterpress should be used for: sharpness of detail and fidelity of color to merchandise, constant control of color, for short runs from type--all types of work, for jobs containing many changes, and control of register.

Offset should be used for: printing all rough or uncoated papers, runs over 20,000—all types of job work, large color spreads.

We realize that the nature of the job greatly affects our decision to use offset or letterpress and may safely say that where true fidelity of color is of prime importance, letterpress has an edge, but where economy plays an important part, offset has the advantage. I am speaking now of the general run of work from 20,000 to 100,000 copies, printed in an average plant.

Because of the greater preparation cost involved in offset, a run under 20,000 is generally more economically printed letterpress direct from the type and original engravings. But there are many other factors that affect our decision. No two jobs are alike in characteristics.

In many cases both processes can be used to advantage on the same job, such as a booklet where various dealers' names are to be printed on the cover. In such cases the body of the booklet could be printed by offset to advantage and the cover printed letterpress so that it would be a simple matter to make the changes during the run. To make those changes in offset would make the cost prohibitive.

In many instances the printer is the deciding factor. If his plant is equipped for both processes, he may decide to use either process depending on the status of his equipment at the time.
Each shop has its own method of production and what may be more economical by letterpress in one shop may be more practical by offset in another. The type and condition of copy available should bear great weight in making the decision—-it is a much more simple matter to reproduce line work in offset than in letterpress where zinc etchings must be made. In many cases where a reprint is desired, the copy itself may be photographed for offset use, while in letterpress the type must be reset.\(^4\)

This is how Mr. Woodman sees the case of Letterpress versus Offset, and which process to use in production of specific types of printing.

**WHAT PROCESS SHOULD BE USED?**

For sharpness of detail and fidelity of color to merchandise—Letterpress
Constant control of color—Letterpress
Printing on all rough or uncoated papers—Offset
For short runs from type—all types of work—Letterpress
Runs over 20,000—all types of job work—Offset
For jobs containing many changes—Letterpress
Large color spreads—Offset
Control of register—Letterpress
Cost (on enamel stock—4-color work)—Tossup

Offset has a decided advantage when using bleed effects because the size of the paper is not so greatly effected, whereas in letterpress a larger sheet is necessary to allow for lockup of the single plates.\(^5\)

The letterpress process is losing ground daily, caused by the fact that the letterpress manufacturers are not doing any


\(^5\)Ibid.
research in this field. They know they have the best process. With this in mind, they continue to rest on their past progress and let the future take care of itself. Even though all processes have their fields, the letterpress field will lose its place at the head of the processes unless a great amount of research is done.

In 1914 the commercial letterpress printers produced 310 million dollars worth of products, and lithography produced 39 million. In 1939 (the latest year for which any figures are available) letterpress produced 515 million, and lithography produced 154 million.\textsuperscript{6}

One of the things upon which the future of letterpress printing is dependent is the photo-engraving industry. The letterpress industry cannot afford to allow the photo-engraver to become stagnant, but in spite of that, many people in the letterpress field are sitting back, expecting new press manufacturers to maintain letterpress position with new developments in presses.

Since its invention, photo-engraving has been the leading factor in the letterpress industry. The flexibility of photo-engraving has in all probability assisted in the growth of letterpress printing as much as the development of modern presses.

Prior to the invention of photo-engraving, the lithographer was dipping into the reserves of the letterpress. With

\textsuperscript{6}Russell J. Hogan, "All Processes Have Their Fields," The Inland Printer, CXII (March, 1944), 53.
the development of photo-engraving, however, the later development of the three-color process, and the still later development of the four-color process, letterpress became the chief process of reproduction.

Lithography steadily lost ground as an important method of reproduction until the development of the offset process.

Mr. Irwin Woodman believes that the offset field will be much enriched in the future. He says:

The future of offset has great possibilities. The industry now has a technical foundation for which it is raising a fund of a million dollars to advance its methods and find new ones. The research laboratories have already developed a photo-composing machine which will furnish type negatives in any setting entirely, which has limited the spread of offset to a great extent.7

Some of the other things that are receiving intensive study are platemaking techniques and controls. When offset has perfected these studies, so that regardless of its chemistry, plates can be produced with mechanical precision as in letterpress, it may, at some future date, with very few exceptions supersede letterpress entirely.

Press plates are now being perfected that will print up to a million impressions, making them practical for use in magazines

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7Irwin Woodman, "There Is No 'Best' Process for All Types of Printed Jobs," The Inland Printer, CXIV (January, 1945), 43-46.
and newspapers, since the present life of a deep etch plate is about 100,000. Proof presses are ready that will make proofs under printing press conditions.

A Brief History of Letterpress Printing

The art or practice of transferring by pressure, letters, characters or designs upon paper or other impresible surfaces, usually by means of ink or oily pigment. As thus defined, it includes three entirely different processes: copperplate printing, lithographing or chemical stone-printing, and letterpress printing. The difference between the three lies in the nature of conformation of the surface which is covered with the pigment and afterwards gives a reproduction in reverse on the material impressed.¹⁸

A. F. Harris gives more information on printing when he says:

Relief or letterpress printing means that the printing surface is raised above the non-printing surface or in relief from it. This method is also called typographic printing. Type, solids, rules, halftones and line etchings are relief surfaces when set or used for letterpress. The relief or raised elements such as type, rules and cuts in this type of printing are locked into forms and then inked. From this inked surface the image is transferred to paper by means of pressure. The form itself can be held for future runs or broken up. When the run is long the form is cast in solid metal called stereotypes or electrotypes.

Relief printing is the oldest of the three methods of printing now in use. Dating back to the stone carvings left by pre-historic man this method has left its life long pattern through the ages of graphic art. From crude stone letters, from wood carving, from ivory blocks and on through centuries, man labored at writing and printing.⁹

⁹A. F. Harris, "Your Next Move," Brief History of Printing.
Movable type was invented by Johann Gutenberg in the fifteenth century. This invention gave the printing art a great impetus, and soon after printing establishments began to spring up in all parts of the continent of Europe. William Caxton was among the first of the printing craftsmen in England. Baskerville and Caslon are other names that are great in the annals of printing.

For approximately three hundred years, from 1500 to 1800, there was little change in the production methods of the printing plant. Early in the nineteenth century, however, the first power cylinder press was built in London and shortly thereafter it appeared in America.

In 1886, Mergenthaler presented the graphic arts industry with the linotype after which Lanston presented it with the monotype. It was about this time also that the halftone screen was introduced, providing for the reproduction of illustrations by photo-mechanical processes.

Planographic or Offset Lithography

Planographic printing is from a plane surface—neither raised nor indented. The printing surface and the non-printing surface are in the same plane. The plate is prepared by chemical
treatment—one which makes the plate attract and hold moisture over the non-printing areas and attract and hold the grease ink over the printing areas, when the plate is dampened. Because water and grease will not mix, the image on the plate repels water and attracts ink. As a result, the printing area—and only this area—retains ink and transfers the image. "Offset" differs from lithography, which is a direct transfer from plate to paper, using no intermediary rubber blanket, in the fact that the offset image transfer to paper is made through the medium of a rubber blanket.

Lithography was discovered in 1796 by a Bavarian actor-playwright, Alois Senefelder, who wished to print and preserve his own plays. He sought to develop a method of ink transfer which would simplify the then cumbersome press equipment and type. He did considerable experimental work in engraving, but as the expense of metal was prohibitive, he turned to the possibility of stone as a printing surface.

By accident, Senefelder discovered that an image made on stone with a greasy substance repelled water; that the non-image portion of the stone attracting the moisture resisted the ink. Ink, when applied to the stone, remained only on the portion treated by the greasy substance, thus providing for an inked impression in the exact duplicate of the image drawn.
This mutual repellancy of grease and water still remains today the true principle of lithography. Until the beginning of the twentieth century, lithography was used principally for quality color work and quality reproduction of illustrations. In the early part of the twentieth century, the offset press was added to lithographic production.

The time and the place of the origin of the offset press are difficult to fix with certainty, but accepted by tradesmen as being authentic. Harris tells the story of seeing a press feeder forget to trip the impression when a sheet was accidentally missed. The plate left its image on the impression cylinder packing, causing the next sheet to appear with two impressions, one on the plate side and another on the reverse side.

The delicate tone and fidelity of this offset impression caused Harris to experiment with a press to reproduce this effect or type of work. With his brother, Charles, A. F. Harris began a series of experiments which culminated in the Harris press.

About the same time, Ira W. Rubel also conceived the idea of offset. He built the original offset press for paper in 1905, first offered to the trade under the name of Rubel.

Offset printing, as the name clearly implies, is a process by which an inlaid image is first made from a printing plate on to
an intermediary surface, then set off upon another. In actual practice, it is an impression from a planographic plate made upon a flexible rubber surface and from that surface transferred to paper or other material, in some instances even being transferred to plastic and tin substances.

The construction of the offset machine mostly in use may be likened to that of the direct rotary, with the addition of a third cylinder. As the machine operates, an inked impression of the design on the plate cylinders is transferred on to the rubber sheet and this, in turn, is transferred to the sheet of paper. A flat-bed offset machine is sometimes used. This is similar to an ordinary stone litho printing machine, but fitted with an additional drum for pressing the sheet against the cylinder covered with a rubber blanket, which takes the impression from the stone. The advantage of this method lies in the fact that a printer can otherwise only get the best results when a paper with a smooth surface is used, but by the offset method, a paper with a rough surface, or material such as cloth or leather, can be printed with remarkable results. The reason is that a sheet of paper has an undulating surface and, when printed by the direct method, the highest "points" on the paper receive the impression; but in effect, the resiliency of the rubber does not only allow for the printing of the highest points but will go down into the hollows, which are naturally more pronounced in a rough paper than in that which has been calendered or coated. Offset printing is used not only for the highest grade of work—such as are subjects, show cards, calendars—but also for the production of newspapers and magazines. The development of this section of lithographic printing is still in its infancy and its possibilities have not yet been fully investigated. In time, however, with a fuller knowledge of the capabilities of the process, difficulties will be surmounted, making it possible to produce illustrated papers with a result equal to that of the other processes.  

Letterpress Advantages

Letterpress through centuries of experiment has rendered the greatest service for pictures of all types that the world has ever known. In some types of pictures, namely gelatin dishes and bakery products, the letterpress process more faithfully reproduces illustrations, bringing out true natural colors. Cleaner, sharper details show up in letterpress work when art layouts call for them.

This is explained by the fact that letterpress forms are in relief (cameo) and impressions therefrom indent the sheet of paper so that a slight embossment shows on the reverse side of the sheet. This may be seen by glancing at the reverse side as it is held at eye level at an angle to the light. This is the easiest way to distinguish letterpress from other processes. The rim of every letter and halftone dot will show more sharply printed because the characters are punched into the sheet and the sharp edges or rims naturally sink a bit deeper, leaving the impressions not so strong inside the rim. A thorough makeready and an ink suited to the paper combine to reduce this difference. It is not visible to the eye and is of slight consequence because the sharp outlines or rims of the units of the letterpress form are what count to make it what it is; the process with the clearest definition and the best coloring in use today. The definition of letterpress is also due to the fact that the print is from metal forms and that makeready can make the most of the superior form. If the halftone plate is shallow in the near solids, or if the makeready is poor, or too much of the wrong ink for the paper is used, the blanks in the near solids become ink traps and fill up to print as solids, but this distortion is minor as compared to those common to the other processes.\footnote{"Is It Letterpress--Is It Offset?" The Inland Printer, CXIII (July, 1944), 62.}
Brighter tones and more illumination or brilliancy are other characteristics of letterpress printing. No other process can compare with letterpress when working with four-color processes.

Consistent color tone can be held throughout the run. Both sides of the sheets will be of the same tone value. In much offset work lack of press and ink control make the light and dark shades through the run and on both sides of the sheet.

In making small quantity re-runs, one or more electrotypes may be run on small presses at low cost. In making typographical changes the time element plays quite a large part. Changes can be made on each run of a bound book of from 50 to 100 pages or more in a minimum amount of time.

Printers who are trying to keep up with the trends of the times ask themselves and others qualified to know: what is going to be the status of letterpress printing in the future? How is it going to fit into the new modern setup?

Louis Flader explains some of the letterpress problems that are prevalent at this time and what to do about them:

Printers fear competition—men in business are worried over the new competition they feel will come their way—competition both from new plants and new products. Many of these worries are imaginary, but they are troublesome nevertheless. These men are afraid that they may be forced to write off large investments in machinery, personnel
training, and other items, and risk corresponding and larger amounts in new things with which they are not familiar. Skilled workers are afraid they will be forced to learn new trades, and wonder how they are going to live while they are learning them.

Looking at the entire printing industry we find the situation so confusing that perhaps it cannot be matched by any other industry comparable in number of employees and volume of business.

. . . Let us grant that letterpress printing, as we know it today, came into being with Gutenberg's invention of movable type. It was supreme in its field because it was the only known method of multiple reproduction and it ruled the roost for nearly four centuries.

Then came lithography, but this new process hardly made a dent in letterpress printing. The invention and development of photo-engraving and the subsequent invention and development of color process platemaking gave letterpress printing its greatest impetus and raised it to new heights. Photo-engraving served to establish very definitely the supremacy of letterpress in the printing field. And then came offset and gravure.

Offset is an adaptation of lithographic principles and procedure which, by the substitution of a thin metal plate for the lithographic stone and the rotary printing press for the lithographic flat-bed press, put lithography into volume production. The adaptation of photography to offset platemaking and printing did for that industry what photo-engraving had done for letterpress printing, and thereby created its greatest rival.

I think it will be admitted without much argument that a direct impression from the printing surfaces to paper is basically superior to the printed image that is derived when there is an intermediary between the printing surfaces and the paper, such as is encountered in offset printing.

. . . It can be readily demonstrated that a certain change occurs when an ink impression of the printing elements is made upon a rubber blanket, and this in turn transfers the impression on to a sheet of paper. The printing area and impression of a line or dot is bound to be altered in this process.
Competition in the graphic arts today is based largely upon the speed of production and the price based thereon. Generally speaking, quality receives far less attention than it did in the past. Progress made in offset is such that the quality gap between these products and the products of letterpress printers is being constantly narrowed and so soon may be bridged altogether. In that event, letterpress as it is now conducted, entailing more time and greater production costs, will gradually have to yield to competing processes and take the consequences.\(^\text{12}\)

**Advantages of Offset Lithography**

Letterpress and offset employ the same halftone screens with dots of various sizes. As the print is from an approximate plane surface, the rims of the dots and letters do not punch and the print is more uniform. On rough surfaces the rubber transfer blanket is able to dip down into the depressions. The ink film is thinner than in letterpress and less of this film reaches the sheet than meets the blanket. If a job looks like it might be either letterpress or offset, if there is no impression on the reverse side of the sheet, then the offset process was undoubtedly used.

The offset process is especially suited to the following:

1. On large media, such as big displays or posters, offset should be chosen because letterpress is handicapped on plate

\(^{12}\text{Louis Flader, "Where Does Letterpress Printing Fit In Postwar Scene? The Inland Printer, CXIV, No. 1, (October, 1944), 33-34.}\)
sizes. (2) Full-color soft reproduction is obtained where work calls for it. (3) Black and white soft reproduction or pencil or crayon drawings.

The lithographer can use any grade of paper and get satisfactory results, whereas letterpress is limited to coated papers and possibly super and English finish for good halftones. By lithography a printer can use rough finish, as antique paper which looks better and feels like a more valuable paper than the coated sheet.

If there is a brochure consisting of four or eight pages 9 x 12 inches which is to be mailed in an envelope, an offset sheet should be chosen with either plain or fancy finish, as it gives a better impression and carries better through the mail. Even though "Please Do Not Fold" is printed on all mailing envelopes, the mailman usually folds it. If it is a coated sheet, the cracked paper mars the illustrations and ruins the intended impression; a fold in either or both directions of offset paper is hardly noticeable.

The advantage of lithography in a mailing piece is evident. A seventy pound offset sheet can be used instead of an eighty pound coated sheet with its greater weight. A saving can thus be made on paper costs and on postage. Average saving in postage is from one to two dollars per thousand.
Very often a rush delivery date can be met only by lithography because of faster plates and no delay for electrotyping. One other advantage comes in backing up the sheet and folding sooner. Offset is adapted to so many different types of jobs which letterpress cannot touch.

Today full advantage is taken of the typewriter or varitype for reading matter which eliminates all type-setting costs. Finally, reproduction can be made by lithography directly from file copy for which type or electrotypes are not on hand.

Anything that can be photographed can be reproduced by offset. Any printed matter from which a reprint is desired need only be photographed; such as letterheads, forms, catalogues, books, testimonial letters, reprints from publications; also charts, graphs, maps, blue prints, and diagrams. Any kind of paper can be used for pictures and even halftones can be reproduced on rough paper.

There is the advantage of speed in preparation of offset copy—that is, speed in setting and making up. Offset does not require standing forms, thereby saving metal and space. All of the offset forms are in negatives. Thousands of these can be put in a letter cabinet in a very small space. Offset has a wider
range of speed in printing; it turns out more impressions of printing per hour.

The question has been asked by many in the printing field who have desired to go into offset: How much will it cost to equip and install an offset department in a plant?

Glenn C. Compton says: ask twenty people the question, and you will get twenty widely differing answers, each one correct if properly qualified.

Obviously there is no one answer, because so many factors are involved. Before you can tell a printer how much he will have to spend to install offset, you must ask him several questions: How many presses do you expect to buy, and in what sizes? Do you intend to install your own platemaking equipment, or to have your plates made outside? If you make your own plates, will you put in only essential equipment: the plate whirler, vacuum printing frame, sink, stripping table, storage cabinets, or will you also purchase what we shall call "supplementary platemaking equipment?"\(^\text{13}\)

It is the consensus of opinion that offset should be experimented with on a small scale before buying much equipment, says Glenn C. Compton in quoting Frederick Triggs, owner of Triggs Color Printing Corporation:

Study your market before you buy any equipment. Analyze your customers' needs, find out what kinds of work they want done by offset or learn if they have work which lends itself naturally to the process, then buy the equipment to

\(^{13}\)Glenn C. Compton, "Cost of Installing Offset Department", The Inland Printer, CXVI (June, 1946), 48.
fit it. Don't buy presses first, then go out looking for any and all kinds of work at any price to keep them busy. Start small, is his second suggestion. It is better to start with one small press, then add more as the business grows. To install one press, along with platemaking equipment, accessories, and supplies that go with it, will require an investment of about $8,000.

Although Mr. Triggs is enthusiastic about offset for certain purposes, he believes there will always be a strong demand for letterpress. He expects to expand his letterpress as well as his offset department. Letterpress, however, is limited to certain finishes of paper when half-tones are involved. Offset covers a wider field—anything that can be photographed can be lithographed.

Offset, though, is not always the cheapest way to do a job, as many were erroneously led to believe in its early days, and it presents a number of difficulties which the letterpress printer may find hard to overcome.14

In planning the offset department, one of the first questions asked is: is it practical to operate letterpress and offset presses and equipment in the same room? R. Ernest Beadie declares that regardless of opinions to the contrary, it is impractical to operate offset presses in the same area where plates are being made. Layouts have been published by manufacturers of offset equipment which not only bring presses and plate-making equipment together, but show a camera installation—an all-in-one department. Beadie maintains that such a

combination is certain to result in production difficulties.\textsuperscript{15}

Oscar Diehl states that segregation of the offset department from other departments is recommended. Many printers have discovered this too late. Just as composing room, and press-room are separated, so too in offset it will be found practical to keep respective offset departments separate. Never will it be wise to combine any offset department with a letterpress department-- this has been learned from experience.\textsuperscript{16}

\footnotesize
\textsuperscript{15}Ernest R. Beadie, "Planning The Offset Department," \textit{The Inland Printer}, CXII, No. 2 (November, 1946), 64.

\textsuperscript{16}Oscar Diehl, "Offset Presswork for the Letterpressman," \textit{The Inland Printer}, CXIII (August, 1944), 33.
CHAPTER III

ANALYSIS AND RESULTS OF THE QUESTIONNAIRE

Explanation of Questionnaire

The purpose of this chapter is to analyze satisfactorily the results of the questionnaire.

In compiling the questionnaire, several points had to be taken into consideration. First, one form would not be sufficient because the mailing list included both commercial shops and school shops. The four types of school shops included: high school, teacher training, trade school and others, the latter being classed as major colleges which had printing departments but did not teach printing.

Conditions existing in commercial and school shops are considerably different in many respects and these conditions had to be dealt with by using different questions. Since the school shop teachers were interested in the outcome of this particular study, they were glad to answer all questions asked.

Many small shop owners have heard of the offset process, but since they have had no reason to inquire concerning it from a business standpoint, they are not qualified to answer many of the questions concerning the differences between these two processes. For this reason, the questions had to be worded in such a manner as to be thoroughly clear in order that there might
be no doubt in the mind of the participant concerning the issues involved.

As many questions as were felt necessary were asked regarding the issues in question, even though some were only remotely connected.

Participants

A copy of the questionnaire was sent to all schools which had taught any amount of printing. It was difficult to find anyone who could give a list of these schools. The writer finally called the State Board of Vocational Education in Austin and even that office could not give the information needed. However, after many inquiries, names of fourteen different participants were obtained.

Selection of participants in the commercial field has been rather thoroughly explained under Procedure of the Study in Chapter I of this thesis and little need be said here except that questionnaires were sent to several firms not actually in the printing business. It was thought best to ask the opinions of some firms in related fields in order that their view of the subject might be obtained. Some of the firms in related fields were photo-engravers, plate graining companies, and paper houses. Since these establishments were doing business with both letterpress and offset companies, their opinions were desired in order to see if they felt the same about the two processes.

In sending these firms the same questionnaire that were
sent to printing establishments, the questions they were asked to answer were marked for their convenience.

Interpretation of Areas of Questionnaire

Questions for the commercial shops had to be made up in such a way as to find out what the commercial field thought regarding different phases of printing in schools, both from a standpoint of producing job work and school newspapers, and also the teaching of the two processes. One particular question asked regarding the competency of school-trained linotype operators was merely an incidental question with no bearing on the subject, but one which the writer was particularly interested in having answered for his own information. The findings on this particular point are included in Chapter IV.

Because of the nature of some of the questions, resulting answers could not be included on the tables prepared for the questionnaires. These questions are treated separately in Chapter IV. For instance, in the form sent to schools, the following questions were not incorporated in the tables: What size offset press would you install if you were introducing offset equipment to a school shop? How much added space is needed to put in offset presses and equipment? What factors determine who will take offset courses? How long does it take to teach a boy of average intelligence the offset press?

Table 1 shows four types of school shops regarding high school, teacher-training, vocational and other. These classes
give the character of equipment of the plant. Average fulltime printers and instructors and average square feet, valuation and number of students employed were also given.

Table 1

| Types of Schools Showing Full-Time Printers Employed, Average Square Feet Floor Space, Average Valuation of Plant, Average Number Students Employed, Number Owning Offset Equipment, Number Planning to Supplement Old, Equipment, Average Number of Letterpresses. |
|-------------------------------------------------|-----------------|---------------|---------------|-----------------|
| Average Fulltime Printers Employed              | High School     | Teacher-Training | Vocational   | Other           |
| Average No. Instructors                          | 1 1/2           | 1 1/2          | 5            | 16              |
| Average Square Feet of Floor Space              | 3,583           | 5,430          | 2,500        | 13,575          |
| Average Evaluation of Plant                     | 17,333          | 42,839         | 55,000       | 193,000         |
| Average No. Students Employed                   | 23 1/2          | 16             | 2            | 8 1/2           |
| Number Owning Offset Equipment                  | 2               | 1              | 0            | 2               |
| Number Owning Supplemental Equipment            | 2               | 1              | 0            | 2               |
| No. Planning To Purchase Offset Eqpt.           | 0               | 2              | 1            | 3               |
| No. Planning To Purchase Sup. Eqpt.             | 3               | 2              | 1            | 3               |
| Average Number Letterpresses                    | 4               | 3 1/2          | 8            | 6 1/2           |
| Total Number of Schools                         | 3               | 3              | 1            | 4               |
According to Table 1, five schools out of eleven owned their own offset presses and plate-making equipment; five out of six planned to buy offset presses and plate-making equipment in the future; nine out of eleven planned to buy new letterpresses to supplement their old equipment.

Table 2 gives opinions from school shops regarding teaching of offset printing in schools. Two out of eleven schools offered courses in offset printing. Nine out of eleven believe that offset teaching in schools is desirable. The other two give no comment.

Table 2

<table>
<thead>
<tr>
<th>Type of School</th>
<th>Is Course in Offset Offered</th>
<th>No. of Printing Employees Asked To Supply Yearly</th>
<th>Average Salary Offered for Employees Requested</th>
<th>No. School Is Able To Supply</th>
<th>Is Teaching of Offset In Schools Desirable</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School</td>
<td>Yes 2 No 1</td>
<td>17</td>
<td>1,800 yr.</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>Teacher-Training</td>
<td>3 16</td>
<td>3,000 yr.</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Vocational</td>
<td>1 10</td>
<td>50¢ hr.</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>4 None</td>
<td>None</td>
<td>0</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
Table 3 deals with volume of work in the two processes, average length of runs, average per cent of work done by offset and letterpress, printing of school annual by offset and letterpress, other school supplies printed by offset, practicality of annuals and newspapers being printed the offset way and whether

<table>
<thead>
<tr>
<th>Type of School</th>
<th>Does Volume of Work Merit Two Processes</th>
<th>Average Length of Runs</th>
<th>Are School Supplies Printed by Offset</th>
<th>Approximate Average % of Work Done By:</th>
<th>Do You Print Your Own Annual</th>
<th>Is It Practical To Print School Annual by Offset</th>
<th>Should School Papers Be Printed by Offset</th>
<th>Should Commercial Papers Be Printed by Offset</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School</td>
<td>Y</td>
<td>3250</td>
<td>1,333</td>
<td>Y</td>
<td>21</td>
<td>22%</td>
<td>76%</td>
<td>2111130123</td>
</tr>
<tr>
<td>Teacher-Training</td>
<td>3</td>
<td>5000</td>
<td>12</td>
<td>1</td>
<td>100%</td>
<td>3</td>
<td>3</td>
<td>33</td>
</tr>
<tr>
<td>Vocational</td>
<td>1</td>
<td>7500</td>
<td>1,250</td>
<td>22</td>
<td>33%</td>
<td>88%</td>
<td>88%</td>
<td>13121213</td>
</tr>
</tbody>
</table>

Y—Yes; N—No; O. S.—Offset; L. P.—Letterpress.
it will be practical to print commercial newspapers by offset.

Table 3 reveals that nine out of eleven schools have enough work to merit two processes. Three schools print their own annuals, one by offset and two by letterpress. Eight say that it is practical to print by this process; two say it is not practical; one has no opinion. Seven do not believe that it will ever be practical to print newspapers by offset, either school or commercial; three believe that it can be done by both.

Table 4 gives the opinions of teachers of printing concerning the suitability and advisability of teaching offset in a school shop, whether plate-making equipment is advisable for schools, whether offset presses are more difficult to operate than letterpress, should the two processes be combined in the same room, should offset be recommended for college and not for high school, and will offset supplement or replace letterpress in the future.

Table 4 shows that ten teachers were of the opinion that offset would be suitable for a school shop and nine thought it advisable, while ten thought it advisable to own plate-making equipment. Seven educators believe that offset presses are no harder to learn than letterpress, but nine out of eleven say that specially-trained personnel should be hired to teach offset. Seven are of the opinion that offset should only be taught in
college shops. Only five were of the opinion that offset would supplement letterpress, while six believed that it would not. However, 100 per cent believed that offset would not replace letterpress.

Table 5 shows classification and per cent of return of

**Table 4**

**Type of School. Is Offset Suitable for School Shop, Is Offset Advisable for a School Shop, Is Owning of Plate-Making Equipment Advisable for School Shops, Are Offset Presses More Difficult to Operate than Letterpresses, Should Specially Trained Personnel Be Hired to Teach Offset, Should the Two Processes Be in Same Room, Should Offset Be Recommended for College & Not High School, Will Offset Supplement or Replace Letterpress**

<table>
<thead>
<tr>
<th>Type of School</th>
<th>Is Offset Suitable for a School Shop</th>
<th>Is Offset Advisable for a School Shop</th>
<th>Is Owning of Plate-making Equipment Advisable for Schools</th>
<th>Are Offset Presses More Difficult to Operate</th>
<th>Should Specially Trained Personnel Be Hired</th>
<th>Should the Two Processes Be in Same Room</th>
<th>Should Offset Be Recommended for College and Not High School</th>
<th>Will Offset in the Future:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>High School</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Teacher-Training</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Vocational</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

* Y—Yes; N—No.
questionnaires sent to commercial shops as taken from Dun and Bradstreet.

Table 6 includes the classification and type shop, whether it is newspaper, trade journal, combination newspaper and job shop, job shop or other. The points of issue were: average number of men employed, average square feet of floor space, average valuation of plant, average number of offset presses, average number of letterpresses, number owning plate-making equipment, number planning to supplement equipment in offset and letterpress and number intending to purchase offset equipment.

Table 6 indicates that only a very small percentage of the total number owns its own offset presses in comparison with letterpresses but that all who do own offset equipment also own their own platemaking equipment. Seventeen shops are planning

<table>
<thead>
<tr>
<th>*Classification</th>
<th>No. Sent</th>
<th>No. Returned</th>
<th>% Returned</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>27</td>
<td>18</td>
<td>67</td>
</tr>
<tr>
<td>2</td>
<td>31</td>
<td>24</td>
<td>77</td>
</tr>
<tr>
<td>3</td>
<td>104</td>
<td>66</td>
<td>63\frac{1}{2}</td>
</tr>
<tr>
<td>4</td>
<td>21</td>
<td>8</td>
<td>38</td>
</tr>
<tr>
<td>TOTAL</td>
<td>183</td>
<td>116</td>
<td>63</td>
</tr>
</tbody>
</table>

*Dun and Bradstreet*
to supplement offset equipment and thirty-three letterpresses while nineteen shops are planning to add offset to their plants. Table 7 gives classification of commercial shops with average per cent of supplies printed by: offset, letterpress, com-

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Newspaper</td>
<td>57</td>
<td>5900</td>
<td>235,714</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>1</td>
<td>T. Journal</td>
<td>200</td>
<td>50000</td>
<td>500,000</td>
<td>1</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>News &amp; Job</td>
<td>83</td>
<td>1553</td>
<td>170,000</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Job Shop</td>
<td>82</td>
<td>40500</td>
<td>220,000</td>
<td>4</td>
<td>9</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Newspaper</td>
<td>15</td>
<td>7000</td>
<td>200,000</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>T. Journal</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>News &amp; Job</td>
<td>6</td>
<td>3987</td>
<td>18,750</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Job Shop</td>
<td>12</td>
<td>5827</td>
<td>77,500</td>
<td>2</td>
<td>6</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Other</td>
<td>13</td>
<td>6366</td>
<td>138,333</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Newspaper</td>
<td>5</td>
<td>1800</td>
<td>12,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>T. Journal</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>News &amp; Job</td>
<td>4</td>
<td>2249</td>
<td>32,646</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>12</td>
<td>4</td>
<td>26</td>
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<tr>
<td>Job Shop</td>
<td>4</td>
<td>2260</td>
<td>21,697</td>
<td>2</td>
<td>3</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>9</td>
<td>3</td>
<td>34</td>
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<tr>
<td>Other</td>
<td>2</td>
<td>1800</td>
<td>10,000</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
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<tr>
<td>Newspaper</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T. Journal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>News &amp; Job</td>
<td>2</td>
<td>1556</td>
<td>9,533</td>
<td>1</td>
<td>6</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>6</td>
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<tr>
<td>Job Shop</td>
<td>5</td>
<td>2400</td>
<td>2,500</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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</tbody>
</table>
bination; average length of runs of offset and letterpress, average per cent of letterpress printing done in black and white, multi-color, three and four color; whether installation of offset equipment increased work; was work increase after offset installation due to normal growth or from adding new process.

Table 7

CLASSIFICATION OF COMMERCIAL SHOPS, SHOWING AVERAGE PER CENT OF SUPPLIES PRINTED BY PROCESSES, AVERAGE PRESS RUNS BY PROCESSES, AVERAGE PER CENT OF BOTH PROCESSES DONE IN BLACK AND WHITE, MULTI-COLOR, 3-4 COLOR; AMOUNT OF INCREASE AFTER OFFSET INSTALLATION, WHETHER WORK INCREASE WAS CAUSED BY NORMAL GROWTH OR ADDING OFFSET.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Average Per Cent of Supplies Printed by:</th>
<th>Average Length of Runs</th>
<th>Average Per Cent of Letterpress Done in:</th>
<th>Average Per Cent of Offset Done In:</th>
<th>Did Install Offset Increase Work:</th>
<th>Was Increase After Installation Due to Normal Growth or Adding Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>O. S.</td>
<td>L. P.</td>
<td>Comb.</td>
<td>Offset</td>
<td>Letterpress</td>
<td>B. M. &amp; W. C.</td>
<td>3-4</td>
</tr>
<tr>
<td>1</td>
<td>30 85 17</td>
<td>10,000</td>
<td>18,416</td>
<td>71 41 14</td>
<td>67 32 17</td>
<td>3 0</td>
</tr>
<tr>
<td>2</td>
<td>30 80 4</td>
<td>13,933</td>
<td>13,357</td>
<td>79 19 10</td>
<td>79 25 5</td>
<td>8 3</td>
</tr>
<tr>
<td>3</td>
<td>41 85 14</td>
<td>5,562</td>
<td>8,357</td>
<td>85 18 7</td>
<td>81 20 5</td>
<td>19 4</td>
</tr>
<tr>
<td>4</td>
<td>35 97 0</td>
<td>5,000</td>
<td>1,500</td>
<td>84 15 5</td>
<td>97 5 0</td>
<td>1 0</td>
</tr>
</tbody>
</table>

* O.S.—Offset; L.P.—Letterpress; Comb.—Combination; B. & W.—Black and White M.C.—Multi-color; 3-4 C.—3-4 Color; N.G. Normal Growth; A.P.—Addition of Process
Table 7 shows that in thirty-one cases job work increased after offset equipment was installed. In each classification it was found that at least eighty-five per cent of printing supplies were printed by letterpress even when the same shops were equipped with offset machines, and that the letterpress showed a greater length of runs.

Table 8 shows classification of commercial shops regarding the following: number which considers offset suitable for any type printing, whether addition of offset would be advantageous, is offset more difficult to operate than letterpress, should two processes be in same room, should a small business own complete offset equipment, will offset ever be practical to print commercial newspapers.

Table 8 also shows that seventy-one shops did not believe offset printing was suitable for all types of printing while thirty-three believed that it was suitable for any type of printing. Over fifty-two per cent believed that offset is more difficult to operate than letterpress. Fifty-eight shops would combine offset and letterpress in one room, while thirty-three would not, and twenty-four gave no opinion. Forty-one were of the opinion that printing newspapers of a commercial nature in the future would be practical, while forty-two did not believe that it would ever be practical and thirty-two shops gave no opinion.
Table 9 gives the classification of commercial shops and their opinions regarding: the offset printing process being taught in school shops, the advisability of or willingness to employ high school, college-trained, or vocational-(school) trained printing employees, the competency of school-trained linotype employees and preferences regarding employees trained

Table 8

CLASSIFICATION OF COMMERCIAL SHOPS SHOWING NUMBER WHO THINK OFFSET GOOD ENOUGH FOR ANY TYPE PRINTING, SHOULD OFFSET BE ADDED TO SHOP, IS OFFSET MORE DIFFICULT THAN LETTERPRESS, SHOULD PROCESSES BE COMBINED, SHOULD SMALL SHOPS OWN COMPLETE OFFSET EQUIPMENT, WILL OFFSET EVER BE PRACTICAL TO PRINT COMMERCIAL NEWSPAPERS.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Number Who Consider Offset Suitable for Any Type Printing</th>
<th>Would Addition of Offset Be Advantageous</th>
<th>Is Offset More Difficult To Operate Than Letterpress</th>
<th>Should Two Processes Be In Same Room</th>
<th>Should a Small Business Own Complete Offset Equipment</th>
<th>Will Offset Ever Be Practical To Print Commercial Newspapers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
<td>11</td>
<td>3</td>
<td>9</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>15</td>
<td>8</td>
<td>9</td>
<td>12</td>
<td>8</td>
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<tr>
<td>3</td>
<td>18</td>
<td>42</td>
<td>29</td>
<td>20</td>
<td>38</td>
<td>14</td>
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<tr>
<td>4</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

* Y-Yes; N-No.
by: apprentice training, intensive school training and no
preference.

Ninety-one shops are of the opinion that offset should be
taught in school shops. Nine shops say that it should not and

Table 9
CLASSIFICATION OF COMMERCIAL SHOPS. SHOULD THE OFFSET PRINTING
PROCESS BE TAUGHT IN SCHOOLS, WILLINGNESS TO EMPLOY HIGH
SCHOOL, COLLEGE-TRAINED, OR VOCATIONAL TRAINED PRINTING
EMPLOYEES, ARE SCHOOL-TRAINED LINOTYPE OPERATORS COM-
PETENT, PREFERENCES REGARDING EMPLOYEES TRAINED
BY APPRENTICE OR INTENSIVE SCHOOL TRAINING.

<table>
<thead>
<tr>
<th>Class</th>
<th>Should the Offset Printing Process Be Taught in School Shop</th>
<th>Advisability of or Willingness to Employ High School, College-Trained, or Vocational Trained Printing Employees</th>
<th>Are School Trained Linotype Operators Competent</th>
<th>Preferences Regarding Trained Employees By:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>14</td>
<td>3</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td>1</td>
<td>3</td>
<td>15</td>
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<tr>
<td>3</td>
<td>51</td>
<td>4</td>
<td>11</td>
<td>49</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>5</td>
</tr>
</tbody>
</table>

fifteen give no opinion. Eighty-seven show willingness to employ high school, college trained or vocational trained employees, thirty-one do employ them and fourteen are opposed. Sixty-three say that school-trained linotype operators are common amount of space it would take to introduce offset said that it prefer employees trained by apprentice training, twenty-one intense school training and twenty-five gave no opinion.

Some of the questions not incorporated in the tables were answered as follows: Regarding the kind of printing that should be done on offset presses, everyone answering this question said that it was good for job work of all kinds, commercial forms, rule work of all types and for printing on rough stocks and especially on the latter when a halftone plate is used. The majority of commercial printers think that it may be best from a different humidity situation to separate offset and letterpress. Another reason is that the two methods are absolutely different in every respect and consequently should be separated. The offset could be placed in the same room with the plate-making equipment (not camera), but separated from the letterpress room.

Seven out of eleven teachers thought it best to start with a small offset press and if it were successful, then a larger one could be bought. The size agreed on by these seven teachers was a 17x22 size press.
The five teachers who gave their opinions concerning the amount of space it would take to introduce offset said that it would require 300 to 600 square feet.

Six out of eleven teachers replied that the desire, attitude, experience and ability were the prerequisites for learning offset and that it takes from one week to a lifetime to become skilled in operating an offset press.
CHAPTER IV

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

In this study the writer's purpose was to determine whether offset printing would take the place of letterpress printing or if each has a field of its own and eventually would supplement each other.

Chapter I of this study gives the statement of the problem, introduction to the problem, previous research, need for the study, procedure of the study and delimitations of the study. Chapter II sets forth data regarding processes, a brief history of letterpress printing, planographic or offset lithography, letterpress advantages and advantages of offset lithography. Chapter III deals with analysis of parts of the questionnaire, explanation of questionnaire, participants (subjects), interpretation of areas of questionnaire. The last chapter includes a final summary, together with conclusions and recommendations.

The final summary of letterpress versus offset printing in Texas is as follows:

1. Inasmuch as five out of eleven schools now own offset equipment and five out of six plan to buy offset equipment it
would seem that the schools have realized the importance of offset. It is of particular interest that the strict vocational shops do not now own offset equipment. Only one out of three contacted plans to install this process.

2. Only two schools are now offering courses in offset printing but nine consider it a desirable practice. This would coincide with the fact that the majority of schools are planning to install offset equipment, probably with the idea of offering courses in offset printing, particularly since nine out of the eleven schools surveyed thought it was desirable to offer courses in offset.

3. Nine out of eleven schools plan to buy new letterpress equipment. This may show that even though schools are buying offset equipment, they are also buying new letterpresses with which to supplement their old machinery. This shows also that letterpress is holding its own with offset. If it were not, few schools would be putting in new equipment, but would keep only what they already have and buy all new offset equipment.

4. Over seventy-five per cent of the school shops believe that it will be practical to print annuals by offset. However, in the printing of newspapers, seven out of eleven do not believe that it will ever be practical to print any other way but
by letterpress. This would tend to show that even though there are newspapers being printed by offset today, they lean more toward the photographic art than toward the newspaper as we have it today.

5. Ten educators were of the opinion that offset would be suitable to college print shops and nine thought that it would be advisable to install this additional process. Ten also thought it advisable to own plate-making equipment. Seven out of eleven teachers believe that offset presses are no harder to learn to operate than are letterpresses. Nine out of eleven recommend that specially-trained personnel should be hired to teach offset. Seven schools are of the opinion that offset should be taught only in college shops. Only five believe that offset would supplement letterpress, while six believe that it would not. One hundred per cent believed that offset would not replace letterpress.

6. There is a total of from seventeen to nineteen (out of the one hundred and sixteen) commercial shops contacted planning to purchase new offset equipment or supplement their present letterpress equipment. This is the same trend as that found among the school shops. Among the one hundred sixteen commercial shops surveyed, averaged figures show that approximately
twelve offset presses are now in use as compared with more than fifty-four letterpresses.

7. Among the commercial shops the majority of offset equipment is now owned by those in the number one, or highest income bracket. But the greatest number planning to add offset equipment is found in the number three bracket. This would indicate that whereas offset has been considered suitable only for the larger shops, it is now becoming practical for the smaller shops also.

8. It has been pointed out in Chapter II of this survey that one of the points in favor of the offset press is its adaptability to long runs. However, average figures show that of all work done, only thirty-four per cent is done by offset, while letterpress is used for eighty-seven per cent of all printing. It may be noted that these figures do not add to one hundred per cent because of the incompleteness of some of the questionnaires; however, these figures are practical for comparison in this study.

9. Approximately seventy-five per cent of all offset and letterpress work is done in black and white. A much smaller percentage is done in two colors with a very minor amount being done in three or four colors.
10. More than eighty per cent of commercial shops gave the opinion that offset is not suitable for all types of printing. Only an approximate thirty per cent considered the addition of offset as being advantageous, while an equal percentage definitely stated that the addition of the new process would be of no particular benefit. More than one half considered offset more difficult to operate, and felt that small shops should not own complete offset equipment. Those answering the question: do you think it will ever be practical to print commercial newspapers the offset way were equally divided in their positive and negative responses.

11. Only nine were opposed to offset printing being taught in school shops. Eighty-seven definitely stated a willingness to hire school-trained printing employees, while thirty-one now have such persons employed. However, of the eighty-seven who stated a willingness to hire school-trained employees, seventy-five stated a preference for apprentice-trained employees. Only twenty-one stated a preference for those having received the intensive school training.

12. Although not directly connected with this survey, it is interesting to note that sixty-three of the eighty-seven answering this particular question, stated that school-trained linotype employees were found to be competent.
Conclusions

The preceding summary seems to justify the following conclusions:

1. Offset printing is not adaptable to all types of printing.

2. Letterpress has a distinct field and offset has a distinct field.

3. Offset would be practical if the runs were long enough and not too much detail needed, as is often the case. An entire offset shop would be practical.

4. Both the letterpress and offset processes have places in the up-to-date print shop.

5. It will not be profitable to print newspapers by the offset method either now or in the future unless the runs are of sufficient length to merit it.

6. Offset will not replace letterpress, but each will supplement the other in its weaknesses.

Recommendations

The writer of this study recommends the following:

1. That offset printing be introduced into all college and commercial shops that have volume enough to justify the installation.
2. That colleges prepare to teach offset printing along with letterpress printing.

3. That a specially-trained operator be hired for a certain period of time to teach the offset process until the local plant manager or other qualified person has learned the process.
APPENDIX

Definition of Terms

Brochure--A small booklet.

Bleed--To run off edge of page.

Calender--A paper-making machine device which gives the high glossy to papers.

Coated Paper--A smooth and glossy-finished paper.

Color Form--The form making the second color in a printing job.

Cover Papers--Heavy, decorative papers used for covering pamphlets, etc.

Dull-Finish Paper--Coated stock with glossy finish removed.

Embossing--Impressing letters and figures in relief.

Enameled Paper--Paper coated with clay, glue and other substances, having a glossy finish.

Gravure--Process of putting ink on paper from thousands of tiny depressions etched into the surface of a plate or cylinder.

Halftone--A printing plate made by the photographic and chemical processes, in which the picture is made up of a series of very small dots.

Harris Press--An offset printing machine.

Highlights--The lightest parts of a printing plate.

Line Drawing--A printing plate made up of black and white.

Lithography--The process of printing from a stone or plate.
Laid Paper--Paper having parallel lines watermarked at equal distances apart.

Makeready--Preparing a press to print from the form in the best way.

Offset Printing--A lithographic process in which the plate prints on a rubber cylinder, which in turn offsets the print to the paper.

Pamphlet--Several sheets of paper stitched together.

Photo-engraving--The process of making printing plates by the action of light on a film.

Photolithography--The process of placing a design on a lithographic plate or stone by photography.

Plate--A duplicate of type forms. A piece of engraved metal used in printing illustrations.

Register--The adjustment of pages so that they will print in the correct position over another printed form.

Relief Printing--Letterpress printing.

Squeeze--To build up under plate to make print heavier.

Wove Paper--Paper having the appearance of a piece of cloth, having fine lines running each way of the sheet.

Zinc Etching--A printing plate made by photography and the chemical processes of acid.

Zinc Halftone--A cheaper form of halftone made in a coarse screen on zinc.
List of Participants

*Aa

Amarillo
Carpenter Paper Co.
Dallas
Allyn & Bacon
American Bible Society
American Book Co.
El Paso
Graham Paper Co.
Fort Worth
Carpenter Paper Co.
Houston
Carpenter Paper Co.
Graham Paper Co.
McAllen
Crocker-Union
Weslaco
Western Lithograph Co.

A

Austin
Steck Co.
Houston
Gulf Publishing Co.
Western Newspaper Union

B-

Beaumont
Enterprise Company, Inc.
Corpus Christi
Dallas
Tigert Printing Co.

B

Abilene
Reporter Publishing Co.
El Paso
Hertzog & Resler

Galveston
American Printing Co.
Houston
Cargill Co., Inc.
Lubbock
Avalanche Journal Pub.
San Antonio
San Antonio Printing Co.
Wichita Falls
Times Publishing Co.

C-

Corsicana
Sun-Light Publishing Co.
Fort Worth
All Church Press, Inc.
San Angelo
San Angelo Standard, Inc.
Waco
Hill Printing & Stationery
Dallas
Exline Lowden Co.
San Angelo
Anderson Paul Co.
Austin
Showalter, G. H. P.
Dallas
Rogers Co. Inc.
Denton
Cross and Nichols
El Paso
Baptist Printing House
Fort Worth
Anchor Prtg. & Lethog. Co.
Dallas
Etheridge Printing Co.
Storm E., J. Printing Co.
San Antonio
Alamo Printing Co.

*Classification from Dun and Bradstreet.
Victoria

D

Fort Worth
Southwest Mag. Pub.

Austin
Capital Printing Co.

Beaumont
Texas Printing Co.

Dallas
Southwest Printing Co.

El Paso
San Antonio
Accurate Litho & Ptg. Co.

Temple
Gresham's

Amarillo
Bright, Sam

Childress
Childress Index, Inc.

Crockett
Crockett Publishing Co.

Dallas
Commercial Ptg. & Letter

El Paso
Phillips, Wm. H.

Houston
Southern Printing Co., Inc.

Midland
Allison, James N.

Orange
Orange Leader Pub. Co.

San Antonio
Gorn-Eau Cord Envelope Co.

San Marcos
Buckner, A. T. & Son

Temple
American Printing Co.

Waco
Davis Bros. Publishing Co.

Schmidt Engraving Co.

F

Alpine
Alpine Publishing Co.

Austin
Lithoprint Company

Brownwood
Brownwood Banner

Bryan
Dillard, R. J.

Cameron
Herald Publishing Co.

Dallas
Allied Printing Co.

Newman Company

Hooker, Jas. Walker

Dublin
Perry, Frances E.

Galveston
Smith & Joyce, Inc.

Harlingen
Main, Quincy A.

Houston
Carroll Printing Co.

Interstate Printing Co.

Kingsville
Kingsville Publishing Co.

Longview
Tapp Printing & Stationery

Lubbock
Gibson, Earnest R.

Mineral Wells
Hartness, Carl G.

Odessa
Odessa Ptg. & Office Supply

Pampa
Pampa Print Shop

Port Arthur
Muller Ptg. & Stationery

San Antonio
International Printing Co.

Shamrock
Shamrock Texan Publishing

Sherman
Dean, Raymond C.

Stephenville
Stephenville Printing Co.

Waco
Henson Printing Co.
Wichita Falls
Humphrey Prtg. & Stationery

Abilene
Hicks, Olan L.

Amarillo
San Jacinto Press
Aransas Pass
Aransas Pass Progress
Bay City
Tribune Printing Co.
Beaumont
Foster, Samuel W.
Conroe
Norton, Donald C.
Corsicana
Stokes Printing Co.

Dallas
Ace Printing & Letter Co.
Powell Printing Co.
Banks, Upshaw & Co., Inc.
Denison
Taylor, F. H. & Sons

Fort Worth
Blackman Printing Co.
Dickerson Printing Co.
Dallahite & Dallahite
Hilburn & Rix Printing Co.

Galveston
Knapp Bros.

Hallettsville
Muller Bros.

Henderson
Farmer, Garland R.

Houston
Wright, Perry and Co., Inc.

Kerrville
Kerrville Mountain Sun

Lubbock
Adams, Harry B.

Marshall
Henderson, W. Horace

Mineola
Wood County Publishing Co.

Nacogdoches
Baker Printing Co.
New Braunfels
New Braunfels Publishing Co.
Orange
Sabine Printing Co.
San Angelo
Concho Paper Co.
Western Printing Co.
San Antonio
Bellinger Bros.
Gordon Printing Co.
Silsbee
Read Printing & Paper Co.
Waco
Waco Printing Co.

Austin
Amarillo Printing Co.
Superior Letter Service

Barkley
Schmitt & Wade

Burkburnett
Burkburnett Star

Corpus Christi
Corpus Christi Press

Dallas
Acme Printing Co.
Record Printing Co.
Standard Office Supply Co.
Wood Printing Co.

Denton
McNitzky, W. H.

Giddings
Giddings News Publishing Co.

Goose Creek
Texas Printing Company

Houston
Jackson Printery
University Press
Woods-Young Company

Huntsville
Smither, LaVerne

Lufkin
Lufkin Printing Company
Midlothian
Midlothian Mirror (Inc.)
Monahans
Sprinkle, Edgar E. Jr.
San Antonio
Kohr Printing Co.
Sunset Printing Co.
San Augustine
San Augustine Tribune
Sherman
Frantz, Reuben H.
Talco
Texarkana
Hendrick Printing Co.
Trinity
Key, Herbert S.
Wharton
Wharton Publishing Co.

Wichita Falls
Avery Letter Service

Beaumont
Uptown Printing Co.
Clarksville
Red River Printing Co.
Ferris
Sprinkle, William A.
Fort Worth
American Letter Co.
Georgetown
Cates, M. L. Sr.
Goose Creek
M. & W. Co.
San Antonio
Baird, D. E.
Sweetwater
Bland, R. T.
Waco
Earls, Joseph W.
Wichita Falls
Hearn Printing Co.
Terry Bros. Printers

Abilene
Foster Printing Co.
Hughes-Chapman Printing Co.
Austin
Schutze, George
Bay City
Shivers Printing Co.
Fort Worth
Seminary Hill Press
Madisonville
Crossley, W. B.
San Antonio
Aztec Printing Company

Abilene
Standard Printing Company
QUESTIONNAIRE FOR COMMERCIAL FIRMS

1. Is your shop a Newspaper........; Trade Journal........; Combination newspaper and job shop........; Job Shop........; Other.................................................................

2. How many men do you employ on your mechanical force?.................................................................

3. What is your approximate floor space in square feet?..............................................................................

4. What is the approximate valuation of your plant?....................................................................................

5. Do you have an offset press? Yes.........No......... How many?.............................................................

6. Do you have a letterpress? Yes.........No......... How many?.............................................................

7. Do you intend to buy an offset press?........................................................................................................

8. Do you think that an offset press is good for any type of printing? Yes................. No............... 
   What type printing are they good for?........................................................................................................

9. Would an offset press be an asset in your shop?........................................................................................

10. In your opinion, are offset presses more difficult to operate than letterpresses?............................

11. Do you think it advisable to combine letterpress and offset in one room? Yes............................ 
    No.................................. Why or why not to above question.............................................................

12. Approximately what percentage of printing supplies in your shop is printed by offset................., 
    Letterpress................., combination of both.................................................................

13. After buying an offset press, did your work increase? Yes.........No.................................

14. Approximately how much of this increase is due to normal growth?.............................................. 
    how much due to switching from one process to another?...................................................................

15. What is the average length of your runs? Offset................. Letterpress.................................

16. Approximately what percentage of your letterpress printing is in black and white...............; 
    multi-color............................... three or four color processes............................................

17. Approximately what percentage of your offset is in black and white............................. 
    multi-color............................... three or four color processes............................................

18. Do you plan to supplement your old equipment in the near future? Offset................... Letterpress.............

19. Do you have your own camera and plate-making equipment.........................

20. Do you think it would be profitable to own this much equipment if you were in business on 
    a small scale? Yes...................... No.............................. How much.................................

21. Do you think that it will ever be practical to print commercial newspapers the offset way? 
    Yes...................... No.............................. Give reasons for this answer............................

22. Would you consider it advisable to teach offset printing in school shops? Yes............... No............
    Why?..........................................................................................................................

23. Would you or do you employ personnel trained in high school or college or vocational printing 
    shops? Would you?.................. Do You?..................................

24. Do you consider high school and college trained printing and linotype personnel competent 
    employees. Yes............... No.............. Do you prefer employees who have had apprentice training?....
    Intensive school training?.................................

25. Please make further comments if you so desire..............................................................................

26. If you should like to have a copy of this survey, please indicate here:........................................
QUESTIONNAIRE FOR SCHOOLS

1. What type of school do you have: High school .... Teacher .......... Vocational ......... other ...............?
2. What is the average enrollment of your school ......... ?
3. How many full-time printers do you employ in the print shop ............ ? How many instructors ...
4. What is your approximate floor space in square feet .......... ?
5. What is the approximate valuation of your plant ............... ?
6. How many students work in the print shop ................. ?
7. Does your school shop have offset equipment? Yes .... No .... Supplementary equipment? Yes .... No .... How much of each? ....
8. Do you consider offset suitable to a school shop? Yes .... No ....
9. Do you think it advisable for a school to have an offset press? Yes .... No .... Why? ....
10. Are you planning to buy an offset press? Yes .... No ....
11. What size offset would you plan to install if you were introducing offset equipment to a school shop? ....
12. Would you advise buying platemaking equipment for the school shop? Yes .... No .... Why? ....
13. In your opinion, are offset presses more difficult to operate than letterpresses? Yes .... No ....
14. Would you advise hiring specialized teachers (pressmen, etc.) to teach and operate equipment? Yes .... No ....
15. How much added space is needed to put in offset presses and equipment? ....
16. Would you recommend combining offset and letterpress in one room? Yes .... No .... Why? ....
17. Do you plan to supplement your old equipment in the near future? Yes .... No .... Principal kind of equipment ....
18. Would you recommend offset for a college shop and not for a high school shop? Yes .... No .... Why? ....
19. Does your volume of job printing merit two processes? Yes .... No ....
20. What is the average length of your runs? Offset .......... Letterpress ....
21. Do you offer offset course to your students? Yes .... No ....
22. Approximately what number of printing teachers or other printing employees are you asked to supply per year? .... Approximate salary offered? .... How many are you able to supply? ....
23. Do you think it desirable to teach offset? Yes .... No ....
24. What factors determine who will take offset courses? ....
25. How long does it take to teach a boy of average intelligence the offset press ....
26. Do you print supplies for your school the offset way? Yes .... No ....
27. Do you have letterpresses? Yes .... No .... How many? ....
28. Approximately what percentage of work is done by offset ....? Letterpress ....? By letterpress ....? By offset ....?
29. Do you print your own annual? Yes .... No .... Reason? ....
30. Do you think it practical to print the school annual by offset? Yes .... No .... Why ....
31. Do you print your school newspaper the offset way? Yes .... No ....
32. Do you think it will be practical to print newspapers the offset way? Yes .... No .... Why ....
33. Do you think that one process will supplement the other? Yes .... No ....
34. Do you think one process will ever take the place of the other? Yes .... No .... Why ....
35. Would you like to have a copy of this research? Please indicate ....
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