

SHORT-RUN BOOK PRODUCTION

Opportunities for Digital Printing



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Introduction

Background

The *Digital Book and Manual Printing Opportunity: Market Analysis and Forecast* (INTERQUEST, 2005) was based on an in-depth survey of leading North American and European book and manual printers and publishers. Its purpose was to review and assess the overall state of the market for digital book and manual printing and examine related technology developments. The study identified three key segments where digital printing was having the greatest impact: trade, education, and professional books. Over the past few years, with advances in color technology, a fourth segment (photo books) has emerged as a high-growth segment for digital printing. This study focuses on these, the largest and fastest growing sectors of the book market for digital printing.

Currently most front-list titles are still produced conventionally due to the run lengths involved. The economics of digital printing instead steer the choice in the direction of back-list titles and other instances which clearly call for on-demand or short-run production. Digital printing is, however, finding relevancy for some front-list books—usually for relatively low-volume titles which are not subject to excessive price constraints, which describes many of the books we examine in this study.

Methodology

In addressing these and other questions, the study focuses on digital book printing for trade, education, professional, and photo books, including developing trends and issues that are influencing the adoption and use of digital printing systems. The study is based on in-depth interviews with 60 printers and publishers conducted in 2007.

Terminology

Personalized vs. customized printing — the study describes two different methods for segmenting book content: personalized printing and customized printing. In the context of this report, we define personalized printing as the inclusion of unique content for an individual copy of a book. Thus, a yearbook might be personalized for a particular student by adding the student's name to the cover along with a special section of school pictures compiled for that individual. We define a customized edition of a printed book as one uniquely adapted for a specific segment of book units. Thus, an instructor's class material might have the instructor's name on each copy and the material versioned for a particular class.

Short-run vs. on-demand printing — the study employs two different terms to describe low-run production. We use the term on-demand to signify printing (down to a quantity of one) at the time someone places an order for a publication. Short run is defined as any small production quantity, which is usually below the break-even curve for offset and digital production. These are clearly not hard and fast definitions, but generally speaking, on-demand print runs generate copy counts between one and 50 units, while short-run book production generally involves more than 50 units, up to and sometimes exceeding 1,000 units.





Executive Summary

Book production was one of the first and most successful applications of digital printing in traditional print markets. At first glance this seems counterintuitive since book printing is a long-standing, tradition bound, price-driven business. While these characteristics have certainly made it more difficult to break through with publishers and book printers, the status quo harbored sufficient waste and dysfunction to open the door to digital production. Significant progress has been made over the intervening two years since we first analyzed the market.

The Book Market

Most large publishers are now owned by media conglomerates, which demand more accountability and higher profits. Large book printers in the U.S. continue to consolidate. Other macro trends in the book industry include ever shortening print runs and turnaround requirements, increased competition from offshore book manufacturers, and growth of the used book market and book returns.

Digital Book Manufacturing

Proponents of digital book production cite a litany of advantages ranging from fully collated output to better supply chain management. The book industry seems now to be listening with a heightened degree of interest.

- The surveys conducted for this study find digital print volume growing anywhere from 7% to 20% per year depending on the book segment.
- Two years ago we found precious little use of digital color output beyond cover production. Today digital color is increasingly finding its way into book blocks.
- Although little personalization or customization is occurring in trade book printing, opportunities for customization are available in EL-Hi and higher education books.
- Centralized distribute-and-print seems to be finding new life in digital book manufacturing.

- Decentralized all-in-one solutions continue to come and go but as of yet remain an interesting side show rather than a serious part of the market.
- Printing systems vendors hope that developments in digital printing and finishing systems will add even more momentum to digital book manufacturing. Image quality has improved across the board making digital solutions more suitable for a wider range of books.

Trade Books

Despite high-profile successes such as *Harry Potter*, the trade market is getting tougher for publishers. Title output continues to escalate along with returns, and the half life of books in retail outlets is diminishing. Overall sales of mass-market paperbacks (MMP) continue to decline in favor of larger soft cover trade formats.

Digital Printing of Trade Books

- In general, trade books face more price constraints than the three other book sectors we examine in this study, and digital producers of trade books have sobered up over the past two years in the face of increased competition and scaled back their predictions for future growth. Even so, the sector clearly offers numerous opportunities and survey respondents expect their digital print volume to grow an average of 20% annually for the next two to three years.
- Cost remains a major inhibitor to the use of digital color in book blocks. Digital providers of trade books surveyed for this study estimate that color output is barely more than 1% of their digital volume today. Yet trade book providers we surveyed are acquiring digital color equipment nonetheless, apparently finding opportunities here and there such as the production of short-run juvenile editions.



Executive Summary

- Digital print quality is less of an issue for trade book printers compared to digital providers in the other growth sectors we explore. Trade book printers indicate that their biggest challenges are cost, competition, and binding.

Education Books

According to AAP (Association of American Publishers), in 2006 books for K-12 (Elementary-High School or EI-Hi) and higher education together accounted for about \$9.6 billion in sales, or about 40% of the U.S. book market.

In the EI-hi market, The No Child Left Behind Act (NCLB) of 2001 has given state and local agencies more resources and flexibility in using federal education funds. Many state and local school districts are ordering shorter production runs of segmented versions of textbooks to meet tighter standards and address English as a Second Language requirements. Education publishers are also driving down order quantities and turnaround time to contain supply chain costs, while online “cyber schools” are both competing with and changing the structure and timing of printed support material.

Electronic textbooks, online educational material, and customized course packs are having an even bigger impact on higher education books.

Digital Printing of Education Books

- Most of the education book printers surveyed for this study use offset and digital printing equipment. The outlook for their offset business in the education market is not too bright, with well over half of the respondents projecting flat or negative growth. On average respondents project a compound annual growth rate of 15% over the next three years for their digital print volume.
- The most promising EI-Hi opportunities for growth are pre-adoption books and teacher’s editions. In higher education, digital providers are finding more short-run applications, producing custom course packs, and offering smaller quantity, softcover runs of hardcover textbooks to lower student costs.

- Three-fourths of the respondents producing education books have color production equipment and they are using it for more than just to produce covers.
- Respondents report an increase in personalized and customized content in education books. Personalization is less common in EI-Hi books, but standards- driven education is creating a need for more targeted material. The market for course packs in higher education has been developing for some time.
- According to the respondents, their top challenges in this market include cost, printing on light-weight paper, competition from off-shore suppliers, and resistance from education publishers.

Professional Books

Professional publishing, including scientific, technical, and medical (STM), legal and financial, computer books, and other business-related categories, hasn’t been a bad business for publishers, boasting above-average profit margins. AAP estimates that the professional segment represented about 14% of publisher revenue in 2006.

- STM (Scientific, Technical, and Medical) publishing is the poster child of the sector, and according to Morgan Stanley was the fastest growing sector of the media industry over the past decade and a half.
- Despite ever-growing litigation and regulatory statutes such as Sarbanes-Oxley, legal and financial printing has been flat or declining in recent years.
- University press books are a unique category, sharing characteristics of trade, professional, and educational books. Although not one of the high-growth sectors included in the survey, university presses offer plenty of opportunities for digital providers.



Executive Summary

Digital Printing of Professional Books

- About two-thirds of the respondents producing professional books have offset and digital equipment. Although these providers expect the overall volume of printing devoted to professional books to be flat from 2007 and 2010, they expect the digital portion of their work to increase by an average CAGR of 10%.
 - Color accounts for only about 2% of the professional book volume produced digitally by the respondents.
 - Personalization is uncommon in the professional books produced by respondents. Even so, they expect it to be a future requirement, even though they are not too clear about why since their customers currently show little appetite or need for it.
 - Top challenges for respondents producing professional books include cost and an increase in competition.
- Key areas of opportunity for digital printing cited by respondents include full-color covers and full-color content for short-run production. All of the respondents producing yearbooks digitally have color digital equipment.
 - Digital providers are also taking advantage of the growing market for photo greeting cards, photo books, photo calendars, enlargements, stamps, and photo mugs. digital photo books usually require very small production runs of unique content.
 - Many of the challenges faced by digital providers of yearbooks and photo books are similar. Both product categories require long shelf life, creating a need for archival quality inks and papers.

Mid-Volume Opportunities

The Photo Marketing Association (PMA) estimates that slightly more than ten percent of the households in the U.S. created some type of photo merchandise in 2005. PMA values the photo merchandizing market at close to \$950 million. Two distinct book types within this market are well suited for digital production—yearbooks and photo books (memory books and calendars). These are among the fastest growing application areas examined in this study.

- The yearbook market has been relatively flat in recent years as student population has leveled off. Yearbook printing is dominated by a few large companies which also provide other related products and services, as well as smaller regional players.
- Although survey respondents report only moderate growth of about 3% in their overall yearbook business, they expect digital output to increase at a rate of about 20% annually.

Conclusions

- The **photographic book market** is the fastest growing of the four sectors analyzed in this report, but it is also the smallest and in the future could be impacted by the attention span of consumers and overcrowding in the market.
- **Education books** also offer opportunities for digital color and personalization, and we expect this sector to grow at about 15% annually.
- The digital manufacturing of **professional books** is nearly on par with trade books in terms of volume, but it faces uncertainty in the guise of online content and increasingly frugal institutional buyers.
- **Trade books** generate the most digital print volume and we believe trade will remain a key area of growth in the future, with new opportunities for color and greater access to longer print runs using lower cost ground-wood stock.



Market Analysis

The Book Market

The overall book market in the U.S. chugs along, with net sales growing at a compound annual growth rate (CAGR) of just under 2.5% from 2002 to 2006. Unit sales were reported by the Book Industry Study Group (BISG) at 3,078.8 million in 2006, up from 2,966.1 million in 2005, a 3.8% increase. BISG projects unit sales through 2009 will grow slowly at a little greater than 1% CAGR.

In 2005 there were about 62,000 active publishers in the US. Nearly three quarters had less than \$50,000 in annual revenues and over 700 had revenue of \$50 million or more. Most large publishers are now owned by media conglomerates, which demand more accountability and higher profits. Large book printers in the U.S. continue to consolidate.

Other macro trends in the book industry include:

- Ever shortening print runs and turnaround requirements have book printers from all walks of the industry fine tuning their operations; those that do not will find it difficult to keep pace.
- Competition from offshore book manufacturers, particularly for full-color juvenile and coffee-table books, as well as some religious, professional, and education books, is a growing problem for domestic producers.
- The used book market continues to grow, taking money out of publishers' pockets and putting it into a burgeoning online used book marketplace.
- Dealing with returns is an integral part of the book publishing game. Returns have grown even higher in recent years, compounded by more titles on the market with shorter shelf lives.

Estimated Net Sales for Total Book Industry in the U.S. (\$ Billions)

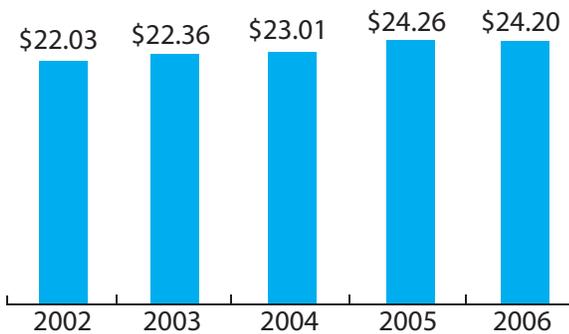
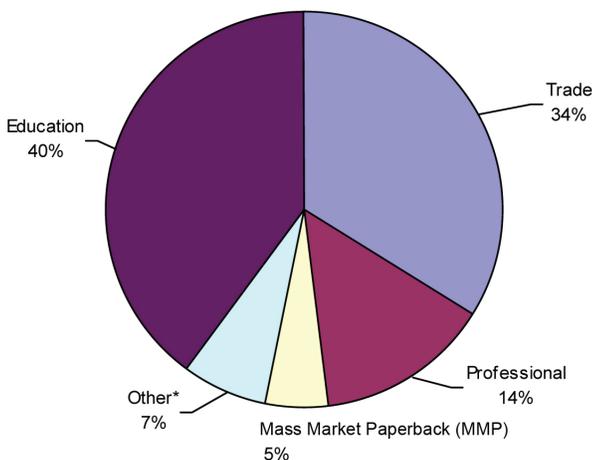


Figure 1. U.S. book publishing industry net sales, 2002-2006 (Source: Association of American Publishers)

Net Sales, 2006

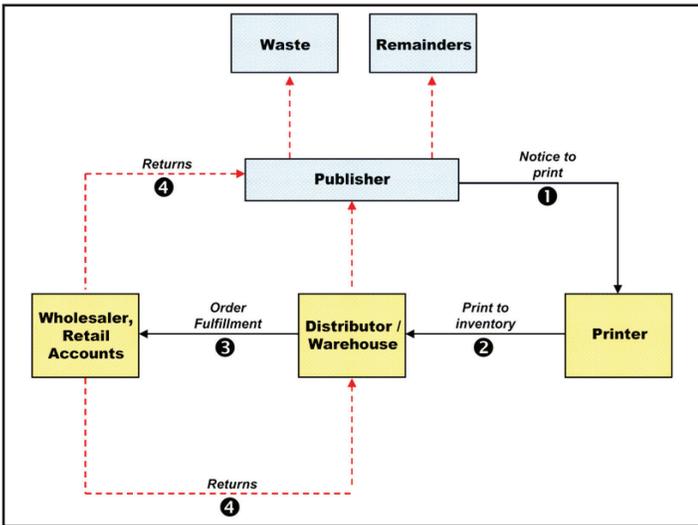


*Includes religious, book clubs, mail order, eBooks, audio books, and all other.

Figure 2. Share of net sales- major book segments, 2006 (Source: Association of American Publishers/Management Practice Inc.)



Market Analysis



(Figure 3. Book Consignment
(Source: INTERQUEST)

“The trend is to go to shorter and shorter runs. The book manufacturing industry is definitely maturing, Distributors are looking for best practices for just-in-time inventory. Returns are the biggest challenge that publishers have.”

Offset printer with about 2% digital capacity.

products and markets) at the head of the demand curve, and moving toward a huge number of niches in the tail.” This shift is clearly encouraged and enabled by electronic commerce since the Internet makes products and companies immediately accessible to consumers who increasingly shop via search engines.

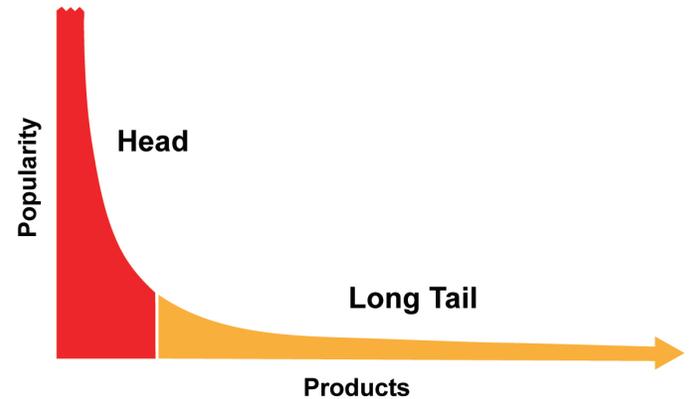
Digital Book Manufacturing Business Models

When we examine how digital printing is being used in the book industry we find two different approaches. On the one hand, companies such as Lightning Source have developed one-off on-demand manufacturing models. On the other, we find publishers and printers supplementing traditional manufacturing with digital printing. In cases where digital printing is used as a supplement, however, its overall portion of the total tends to be small percentage of print volume, but is growing.

The Long Tail

The on-demand model is well exemplified in Chris Anderson’s book *The Long Tail: Why the Future of Business is Selling Less of More* (Hyperion, 2006), which has received ample play in digital printing circles. The book describes a paradigm shift in how businesses approach their markets. “Our culture and economy are increasingly shifting away from a focus on a relatively small number of hits (mainstream

The New Marketplace



(Figure 4. The “Long Tail” marketplace
(Source: Chris Anderson, *The Long Tail*)

The “long tail” model manifests itself in several ways in the book industry. New technology has made the electronic storage of books much easier to set up and maintain, and digital printing technology has made it economical to print ultra short runs down to a quantity of one. Inventory concerns are thus eliminated and publishers can keep titles in print longer and produce them as needed. Software improvements have also enabled automated work flows such as online proofing and preflight, further streamlining and shortening the book manufacturing cycle.



Market Analysis

In addition, this model opens up niche markets, enabling small publishers and self-publishing authors to thrive with few concerns about economies of scale. Small publishers have been a feature of the book market for some time now. About \$6–\$7 billion of revenue comes from publishers who have revenue of under \$50 million dollars a year, and the long tail model will no doubt continue to benefit small publishers.

Key Trends

Volume Growth

Proponents of digital book production cite a litany of advantages ranging from fully collated output to better supply chain management. The book industry seems now to be listening with a heightened degree of interest, and even stalwart one-off producers such as Lightning Source report more participation from traditional players such as large publishers.

Digital Color Printing

Digital color printing has primarily been used in the book market to produce covers for digitally produced book blocks. Yet this is changing, and today we find color digital presses used to produce full-color education books, children's books, photo books, yearbooks, and even some professional books. This trend will continue as the cost of operation of the equipment continues to decline while image quality and speed improves. Opportunities for digital color printing are more limited in the general trade book segment, which is still predominantly monochrome.

Customization & Personalization

The survey conducted for this report finds very little personalization or customization taking place in trade book printing. However, in education the use of customized textbooks in EL-Hi and higher education is growing substantially. Personalization is omnipresent in photo books and is gaining popularity with yearbooks. Opportunities have also developed with the production of personalized travel guides through the Internet. A traveler can build a personalized guide of a journey which only features the locations that will be visited rather than purchasing separate guides for multiple countries, regions, and cities. The personalized travel guides can then be printed and bound at a nearby print site.

The Impact of Google

Major e-commerce players such as Google and Amazon have probably provided as much, if not more incentive for publishers to move into the digital world than on-demand printing per se. The primary reason is that Google and Amazon in particular, have taken aggressive steps towards monetizing digitized content owned by publishers. Amazon, for example, has announced its intention to give consumers who pay a nominal fee perpetual online viewing of books purchased from Amazon's site. In many cases the books have been digitized by Amazon from physical copies. Publishers clearly do not want to miss out on revenue opportunities afforded by nontraditional use of their content and are thus beginning to develop their own digital strategies.

Content Aggregators

Organizations called themselves "content aggregators" have been riding the wave of Google and Amazon initiatives. Their business model relies on out-of-print public domain titles which are scanned, sold over the Internet, and produced on-demand for a low price. One such publisher (a one-man operation) recently put 50,000 public domain titles back in print with the help of a print-on-demand provider. The publisher is selling the books for less than \$10 and realizing a substantial profit margin.

Self Publishing

CreateSpace, which is part of the Amazon.com, Inc., announced the launch of Books on Demand service in 2007. The service works the same as CreateSpace's DVD and CD on demand offerings. CreateSpace books sold on Amazon.com display "in stock" availability, are produced on demand, and can be shipped within 24 hours from the order date. The service does not charge set up fees or require minimum order quantities. Members are required to purchase and approve one proof copy of their books before they can be sold. Small quantities of books published via the service are printed in one of Amazon's fulfillment centers, and larger quantities produced by BookSurge. Lulu.com now has 120,000 titles available for sale. In 2006 Lulu.com sold 86,113 different softcover book titles, and 10,516 different hardcover book titles. Although the company's average run length is 1.8 copies, the company says that a "hit" can sell in the range of 5,000 to 10,000 copies.



Market Analysis

eBooks

eBooks first appeared on the market at the end of 1998. At that time, some industry analysts predicted that the eBook market would reach \$2.5 billion by 2002. Since their introduction, however, eBook sales have been sluggish and the so-called eBook revolution has yet to occur. According to the International Digital Publishing Forum (IDPF), sales of trade eBooks via wholesale channels increased from \$7 million in 2003 to \$20 million in 2006.

However, a new generation of lower cost, higher quality, and more functional eBook readers have come to the market, and eBook sales are increasing.

Distribute-and-Print

The interest in centralized distribute-and-print services for both trade and professional books has increased in recent years. Lulu.com now has distribute-and-print partners in Europe with plans to add partners in Asia later this year. In June 2007 the self-publishing service Blurb announced a partnership with a printer in the Netherlands to print, bind, and ship books from one central location for the European market. Lightning Source also plans to increase its distribute-and-print activity and plans to open new print sites in several regions of the world over the next few years.

Decentralized distribute-and-print solutions also continue to appear on the market. In our 2005 study of the digital book market we reported that some niche printing systems vendors had developed systems that enable bookstores to download books from virtual libraries on the Internet and print them on demand on desktop and midrange network printers. These included On Demand Machine, InstaBook, and Marsh Technologies. We also noted that these systems thus far had very limited success in the market. Two years later, the idea is still alive, but still has not found much traction in the market.

Vendor Developments

Since our 2005 study of digital printing in the book market, a number of developments in digital printing hardware, software, and support services have been introduced which are helping the market develop and grow.

Print quality has improved both on cut-sheet models with a new generation of systems introduced by the

leading players Xerox and Océ, and from improvements in continuous-feed units by vendors such as Océ and IBM (now InfoPrint Solutions Company). Océ unveiled the VarioPrint 6250 cut-sheet system in 2006, featuring 1200-dpi resolution and high-quality grayscale rendering. In 2007, Océ launched lower-speed versions (160 and 200 ipm) of the 6250. Xerox announced the Nuvera EA Digital Production Systems at AIIM OnDemand 2007. These systems use Xerox EA toner and currently comprise three models offering speeds of 100, 120, and 144 ipm. EA toner is a chemical toner that improves print quality by producing finer lines, sharper text, better halftones, and deeper solid blacks.

Vendors have also improved speed and throughput on cut-sheet and continuous-feed systems. During the past decade the speed of monochrome print-on-demand cut-sheet systems had been limited to 180 ipm. Océ and Xerox have recently broken through with faster units. The Océ VarioPrint 6250 produces 250 ipm, and the Xerox Nuvera 288 DPS with EA toner 288 ipm. Nipson and Delphax each announced new 500-ft./min. continuous-feed systems in 2007.

New color production systems have also been announced by most of the leading players. These new systems offer higher speeds, better color management, greater substrate flexibility, and lower TCO.



Figure 5. Xerox Nuvera 288 featuring EA toner
(Source: INTERQUEST)



Market Analysis

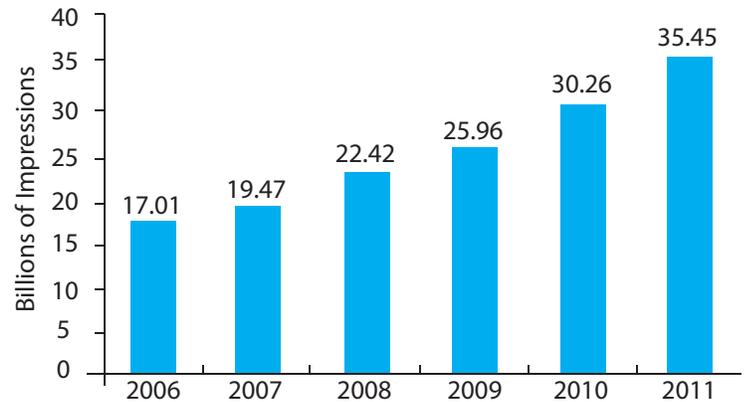
Vendors have also introduced new software designed to improve book manufacturing workflow. Océ announced enhancements to PRISMA Production software at the end of 2007. These include PRISMAprepare, designed to enable optimized PDF-based workflow, simplified book manufacturing, and color splitting and merging capabilities. A one-click book creation feature creates spine captions and can generate duplex-printed tabs with up to three lines of text. Using pre-defined criteria, the software automatically calculates adjustments for page creep and spine captions. Also at the end of 2007, InfoPrint Solutions launched InfoPrint BookFlow. BookFlow is integrated end-to-end book production software developed by InfoPrint partner companies such as Ultimate and IoFlex. Ultimate's Imostrip OnDemand provides low-cost, intuitive, automated imposition for complex signatures.

New pre- and post-processing options have also been announced in recent months. Finishing vendors such as Lasermax Roll Systems and Duplo have worked closely with their printing systems counterparts to develop solutions especially suited for book manufacturing. While many segments of the book market are transitioning to light weight grades of paper to defray rising transportation costs, digital print providers are excited about recent developments with mechanically-pulped (groundwood) paper. Uncoated groundwood grades are used to produce more than one-third of trade books, and also find application in some education and professional editions.

Market Size & Forecast

INTERQUEST forecasts that book printing volume produced in North America on digital equipment will increase from 17 billion letter-size impressions in 2006 to 35 billion in 2011—a 15.8% CAGR over the period.

Digital Book Volume, 2006-2011



We estimate that in 2006 digital printing represented about 2.7% of the total book print volume produced in North America—up from 1.7% in 2004. We expect this percentage to increase to nearly 6% by 2011 as conventional book printing volume remains flat during the period.

Trade Books Market Analysis

Overall market demand for trade books continues to grow primarily in the soft cover categories. Sales of mass-market paperbacks continue to decline as the reading population ages and publishers switch to larger softcover trade formats. AAP estimates that sales of adult and juvenile hardbound and paperbound titles, along with mass-market paperbacks represented about 39% of publisher revenue in 2006. According to BISG, these segments accounted for about 74% of publisher shipments in 2006.

“When we started with digital printing a few years ago, we got a lot of resistance up front because of the print quality. There were some considerable concerns about the halftone and screen print quality. That has gotten better and better over the past few years.”

Large U.S. trade book publisher



Market Analysis

Promotion and marketing is a key challenge for trade publishers because more titles are being released and shelf life is shorter. Traditionally a relatively small number of blockbuster titles have a major impact on the trade book market.

Yet large trade publishers cannot rely exclusively on best sellers. In a recent interview published by Book Business, Jane Friedman, President and CEO of HarperCollins, notes that, "In fact best sellers may be the least fiscally responsible way to go, ...so we spend a great deal of time on our back list. Obviously we have a lot of best sellers, but the mix is what's important, and the back list is a significant part of it."

Digital Printing of Trade Books

INTERQUEST forecasts that the volume of trade book printing produced in North America on digital equipment will experience a 20% CAGR from 2006 to 2011. Overall, trade is the largest book segment representing over half of the book units sold, but to date digital printing has captured a small percentage of the trade market. However, the trend toward shorter runs, the fact that more trade publishers are aware of the benefits of digital printing, and the fact that most trade book printing is monochrome text will fuel the growth of digital printing over the next few years.

Another positive sign of growth is that most of the printers surveyed have purchased new equipment over the past 18 months. Although providers continue to meet with some resistance from publishers, improvements in digital production systems introduced by equipment vendors in recent years have helped raise the overall acceptance level among consumers, publishers, and printers.

Large conventional book printers in North America such as R.R. Donnelley, Offset Paperback Manufacturers, and Transcontinental have thus far focused their digital printing services on short runs. The average run lengths produced by these printers on digital equipment range from 300 to 800 copies.

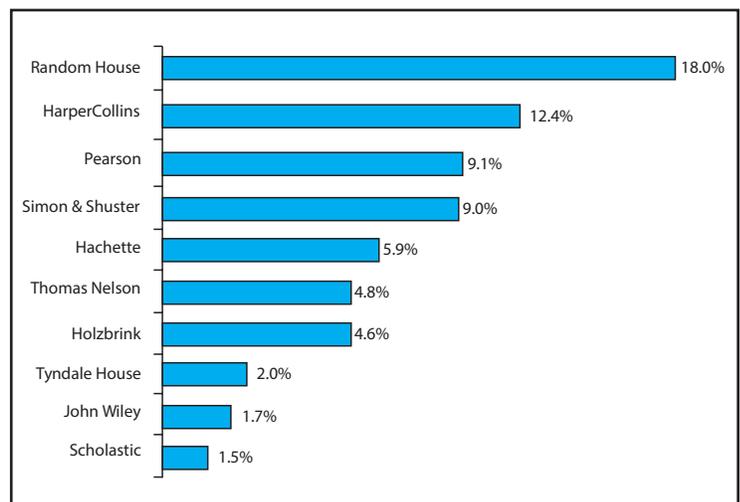
Lightning Source, by comparison has established a pure, one-off on-demand model (its average run length is 1.8 copies). In recent years, as publishers have grown more attentive to reducing inventory

and applying just-in-time manufacturing techniques, Lightning Source's message has gained more attention and credibility.

To date the use of digital color printing to produce trade books has been relatively limited. Most trade books only contain monochrome text, and the quality and cost of digital color printing has historically been unattractive for those trade books which do require color. Yet vendors of color digital presses have over the past several years enhanced the photographic print quality of their systems and lowered the total cost of operation. As a result, digital color printing is now beginning to be used to produce color pages and as well as covers. Digital color printing also enables North American printers to compete more effectively against Far East manufacturers of children's books.

Key Players

The top ten trade publishers in the U.S. account for more than two-thirds of the total market. Random House has the largest market share (18%), followed by HarperCollins (12%), Pearson (9%), and Simon & Schuster (9%).



Based on rolling 12 months ending February 2007

Figure 7. Top ten U.S. trade publishers
(Source: Michael S. Hyatt, Thomas Nelson Publisher)

Top U.S. trade book **printers** include R.R Donnelley, Quebecor World, and offset Paperback Manufacturers (OPM).



Market Analysis

“Not long ago, publishers of EI-Hi education materials produced one or two versions of a discipline. Today, a series may involve twenty or more state-specific versions of mandating a very high level of control throughout the manufacturing process.”

El-Hi book printer whose digital book production is growing by 15% per year

Education Books

Market Analysis

According to AAP, from 2002 to 2006 the EI-Hi and higher education segments of the book market enjoyed a 1.7% and 3.4% CAGR, respectively. The education publishing market has changed significantly in the past three years due to a number of major acquisitions and divestiture.

El-Hi

Changes in the education market have in many instances created demands which favor digital production.

- **Shorter run lengths** — A number of factors in the EI-Hi market favor shorter print runs:
 - » NCLB legislation and segmentation requirements of English as a Second Language have made shorter production runs of targeted material more desirable.
 - » Publishers in this segment of the market, as in almost all book segments, are trying to contain warehousing costs as well as overproduction of education books. Digital printing enables them to print in smaller quantities more frequently.
 - » Digital production can be more cost effective for end-of-life and back list EI-Hi titles produced in smaller quantities.
- **Tight turnaround** — A trend toward shortening the production cycle for certain classes of books has driven the demand for digital technology. Printers are turning to digital

technology to meet the shorter turnaround requirements for new editions in pre-adoption and adoption cycles.

- **Granulation of versions** — A key challenge for education publishers and teachers is to make textbooks visually interesting and appealing to students to encourage them to read and retain the information. In addition, publishers are finding greater demand for versioned books on a state or large municipality level, creating more titles but shorter print runs.
- **Cyber schools** — So-called “cyber schools” tend to reject traditional hardcover textbooks in favor of electronic materials, and not only for cost considerations. Cyber school teachers often work with their students in non-conventional ways and require different types of support material. As competition increases in the growing cyber school market, which still offers relatively high margins, large publishers are offering schools integrated learning solutions which combine online material with shorter, customized support materials.

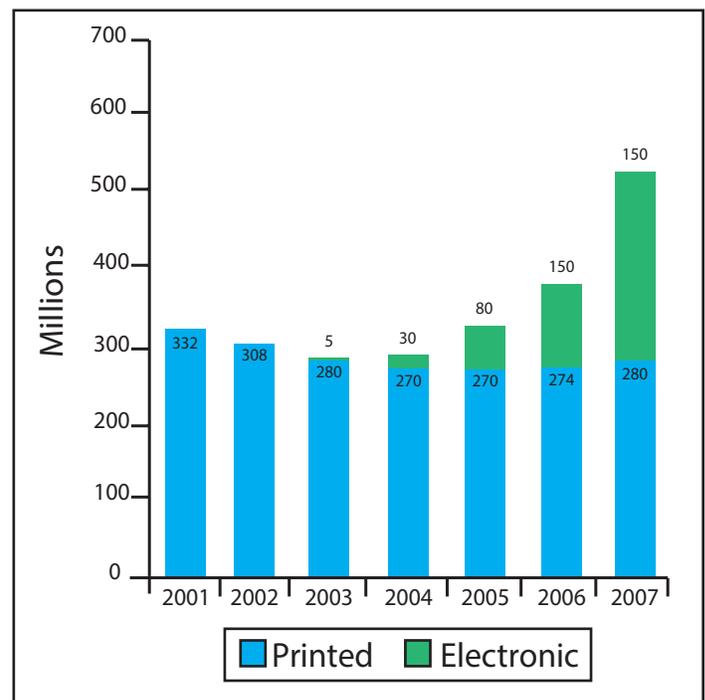


Figure 8. Printed & electronic education & professional books, 2001-2007

(Source: Veronis Suhler Stevenson, Communications Industry Forecast and Report, July 2003)



Market Analysis

A number of publishers offer college students electronic alternatives to printed textbooks, which expands the functionality of textbooks as well as reduces the cost for students.

A great deal of attention has been given to the rising costs of textbooks for university students. Students spend on average \$600 to \$900 each year on textbooks. According to a study by the Government Accountability Office (GAO), book costs have nearly tripled over the past two decades. Publishers, state governments, universities, and public interest groups are working to lower these costs.

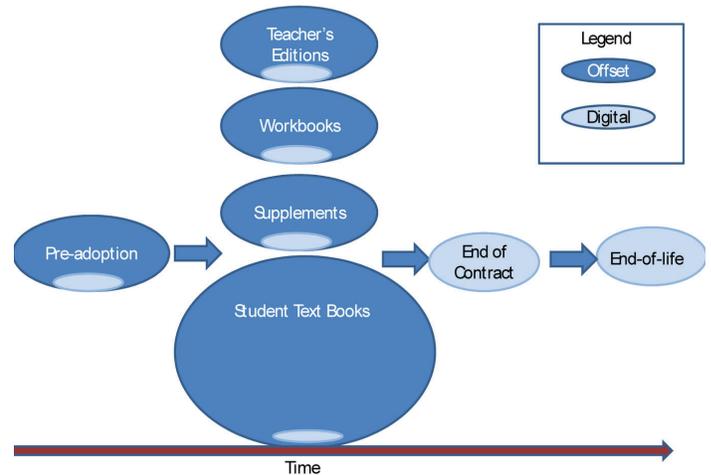
Digital Printing of Education Books

INTERQUEST forecasts that the volume of education book printing produced in North America on digital equipment will increase by 15% per year from 2006 to 2011. Our 2005 book study found that printers were slower in adopting digital technology due to the low acceptance among publishers. The current study finds that education book publishers are beginning to accept that digital printing, in combination with offset, can provide a more cost effective production model. Quality has improved, costs are coming down, and the break-even between offset and digital production has increased.

El-Hi

Digital printing is beginning to play a prominent role in the life cycle of K-12 education books. Before a textbook is purchased in many states and municipalities, it must go through a rigorous adoption cycle where it is reviewed, edited, and approved for use. Classroom texts consist of workbooks, supplemental aids, and textbooks for students, while teacher's editions include reference material and answers. Smaller quantities of books may still be required near the end-of-life or end-of-contract phase of a textbook.

Lifecycle of the El-Hi Educational Book



In recent years digital printing has become more attractive due to higher machine speeds, workflow enhancements, and quality improvements in both black and white and color. These improvements have created a number of segment opportunities. These include pre-adoption books, end-of-life books, teacher's editions, customized inserts for offset books, focus books, workbooks, state and region versioned student textbooks, and special media (acetates, posters)

Two of the largest growth areas for El-Hi digital book production are in teacher's editions and pre-adoption books.

Teacher's Editions — Sixty percent (60%) of the El-Hi education book printers surveyed for this study produce teacher's editions. These books can be well over a thousand pages in length and include resources to supplement the material contained in a student textbook. Because the books are used by teachers, run lengths are about twenty times smaller than student editions. Although the books can be produced in black and white and spot color, a growing portion is printed in full color.



Market Analysis

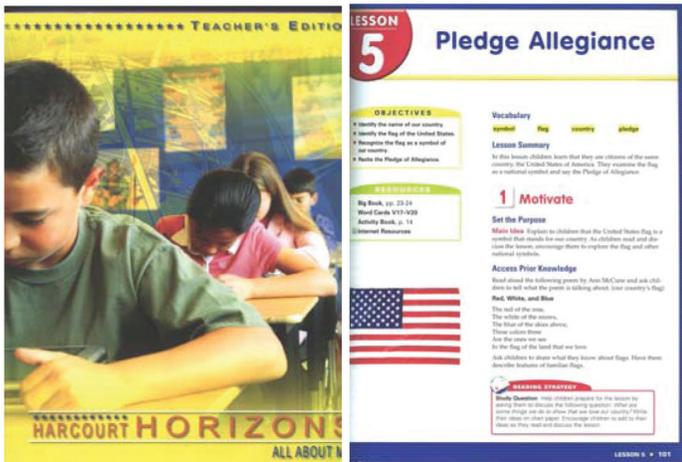


Figure 10. Teacher's edition printed on HP Indigo press 3250
(Source: Hewlett Packard)

Pre-Adoption Books — According to a survey conducted by the California Public Interest Research Group (CALPIRG), on average, publishers release new editions of textbooks every 3.8 years. These books must first go through an adoption process. In twenty-one so-called adoption states, textbooks are selected on a statewide basis. Publishers send samples of the materials they have developed for educators to review. Pre-adoption samples are not required to be in the final format, but must be in the same size and color of the final material. The review process encompasses several steps, each requiring a specified number of books to be sent to reviewers. The large number of revisions required at each step of the process can be time consuming and make digital printing even more attractive.

Although survey respondents do not report a need for **personalized El-hi textbooks**, they do see increasing requirements for customized textbooks. NCLB could increase Pre-K-5 supplemental educational materials as much as 15 percent. ESL as well as the Special Education market are also driving publishers to create more specialized content. The segmentation of content is creating more niche markets in reading, math, science, and social studies. More teachers' editions are also needed to train mainstream classroom teachers in these special areas. State, regional, and local versioning is also becoming more common in the El-Hi market.

Higher Education

Trends in the higher education market which are creating opportunities for digital production include:

- **Shorter run lengths** — As in the El-Hi segment, shorter run lengths are helping control warehousing and inventory costs. The Internet is also influencing the shortening of revision requirements in college textbooks. In order to compete with online material which can be continually updated, textbooks must have current information, especially in subjects like history and science.
- **Custom course packs** — Suppliers have expanded the breadth of software available and made it more accessible to professors by giving them the ability to go online and develop customized course packs. As a result, professors are taking the initiative to customize their course materials to a greater degree.
- **Emerging color opportunities** — Digital color is not a large growth area for higher education. The college market is primarily a monochrome digital market, but color is being introduced in some areas such as the sciences.
- **Cost issues for students**—In addition to used textbooks, another method for reducing cost is to provide different formats geared toward cost containment. Instead of producing a large quantity of a hardback book with a color cover, versions can be produced digitally in smaller quantities with soft covers or less costly finishing options such as loose leaf pages.

The college market has used both customization and personalization in the past few years. A number of publishers/printers in this market have built extensive database systems so that professors can build textbooks with customized covers, content listings, professor information, and course number incorporated in the publication.



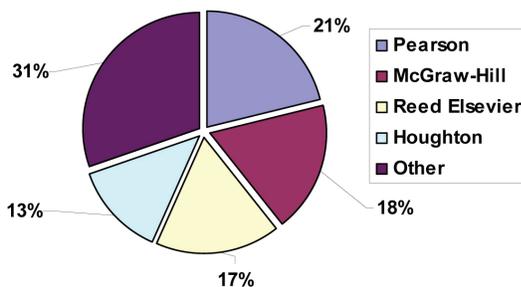
Market Analysis

Faculty members can now choose content from one or more textbooks, newspaper articles, lecture notes, white papers, art, photos and visuals, and personal research. Digital printing and electronic content provide tangible benefits for customized textbooks by segmenting books for partial printing while lowering the cost of production for shorter runs.

Key Players

According to Goldman Sachs Research estimates, four publishers dominate the EI-Hi market. Consolidation of the major education publishing companies over the past five years has created a concentration of volume and a more competitive pricing environment for printers. Many offset printers have found that adding digital capabilities to their production environment often helps them offer a more robust set of book products and solutions to publishers.

El-Hi publishers' estimated 2006 market share*



* prior to acquisition by Houghton Mifflin of Harcourt Education & Trade divisions from Reed Elsevier

Figure 11. El-Hi publisher's estimated 2006 market share (Source: Goldman Sachs Research estimates)

A number of printers serve the education book market. These include Ames OnDemand, Courier, Malloy, Mercury Print, Offset Paperback Manufacturers, Quebecor World, Transcontinental, and Webcrafters.

Professional Books

Market Analysis

Professional publishing, including STM, legal and financial, computer books, and other business-related categories is a relatively profitable segment of the industry. AAP estimates that the professional segment of the book market increased by 1.7% per year in revenue from 2002 to 2006.

STM Publishing

According to Morgan Stanley, over the past 15 years STM publishing was the fastest growing sector of the media industry. Research has shown that established STM publications are largely price inelastic, and the margins of commercial STM publishers have historically been healthy.

Mark Ware Consulting estimates the worldwide English-language STM publishing market at about \$5 billion. Morgan Stanley estimates that about two-thirds of STM revenue is derived from the scientific and technical information market, and about one-third from the medical sector. According to Versita, the medical market consists of books (42%), journals (27%), databases (14%), newsletters (10%) and other products (7%), while the scientific and technical market consists primarily of journals (65%), books (25%), and other miscellaneous products (10%). Online content is playing an increasingly important role in both markets.

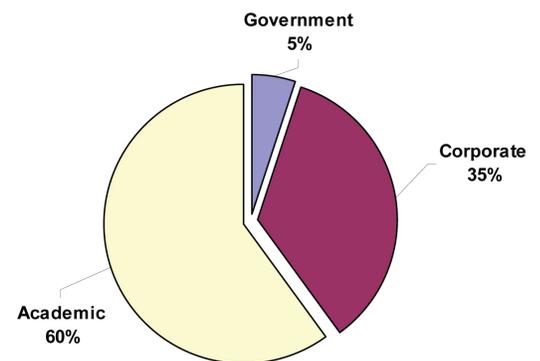


Figure 13. Scientific and technical information market by consumer segment (Source: Organization of Economic Co-Operation and Development, OECD)



Market Analysis

According to Mark Ware Consulting, the number of journals published worldwide has increased at about the same pace as the number of researchers—between 3% and 3.5%. In recent years, however, the profit margins of publishers have decreased, though margins still remain healthy overall.

Legal & Financial Publishing

Increasing levels of legislation and litigation (as well as the increasing number of lawyers) have driven the growth of legal and regulatory markets worldwide. In the U.S., increasing regulatory complexity and stringency largely stemming from the Sarbanes-Oxley Act, which significantly impacted the accounting labor market, has increased the demand for compliance information and software tools.

Legal and financial publishing is a highly concentrated market dominated by two major publishers in the United States (Thomson West and the LexisNexis division of Reed Elsevier). Over the past few years, these companies have acquired smaller organizations to expand their offerings.

Overall, printed legal and financial publications have been relatively flat or slightly declining. Instead, the legal and financial market has experienced growth in online services and integrated solutions, hand in hand with a rapid decline in CD-ROM publications.

Computer Books & Other Business-Related Publishing

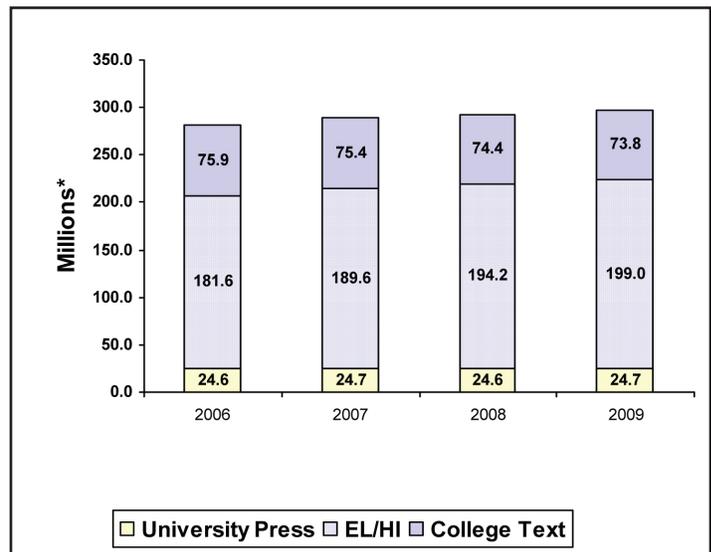
Sales of technical, business application, and other books about computers, electronics, software, and operating systems have largely recovered since the dotcom crash in 2001. As with many other segments of technical publishing, however, online content has impacted the computer book market. Although sales tend to be concentrated in bestseller titles, some smaller publishers offering electronic-only books have done well.

The leading publishers of computer and related books include Pearson (with imprints including Addison-Wesley, Prentice-Hall, Peachpit, and Adobe Press), Wiley (including Wiley and For Dummies imprints), O'Reilly, Microsoft, McGraw-Hill, Thomson, Springer (with APress), and Reed Elsevier.

University Press Books

Although university press books are not one of the high-growth sectors addressed in the survey conducted for this study, they have and will continue to offer solid opportunities for digital providers. In recent years a number of major university presses have undertaken serious efforts to use on-demand printing to tap their extensive backlist catalogs and to control returns.

University presses hold a unique spot in the book industry, providing research-driven, peer-reviewed titles on a broad range of academic topics. Their primary mission is to make books available at a reasonable cost for scholars and libraries, but to do so they must remain on a sound financial footing. University press titles have never captured a very large share of total book sales, however. According to the U.S. Department of Commerce, books published by university presses captured only about one percent of total domestic consumer expenditures for books in the U.S. in 2005.



* Net publisher shipments after returns

Figure 13. Quantity of university press books sold, 2005-2009
(Source: The Statistical Abstract of the United States, U.S. Department of Commerce, 2007)



Market Analysis

University presses in general face a number of challenges which have grown more acute in recent years. Many university presses hope to break even at best, and most depend on subsidies from their parent institutions and other sources. Key challenges for university presses include:

- Decreases in public funding as well as declines in subsidies from universities
- Cut backs in university press books purchased from libraries
- Competition from large commercial academic presses
- Increasing used book sales, particularly from on-line retailers such as Amazon
- Growing use of customized course packs and free downloadable electronic books

In counteracting these trends, some university presses have focused more attention on the trade market, hoping regional and crossover titles will boost revenue.

The Internet and on-demand printing have been embraced by many university presses to reduce costs associated with warehousing and distribution, keep low-selling titles in print, and mine back list catalogs.

Digital Printing of Professional Books

INTERQUEST projects that the volume of professional book printing produced in North America on digital equipment will increase grow by about 13% annually from 2006 to 2011. Although the professional book segment is becoming more competitive, new opportunities—particularly in STM—are emerging due to improvements in image quality on monochrome digital printing systems and the availability of high-quality/lower-TCO color digital presses.

We estimate that in 2006 digital printing represented approximately 5% of the total professional book print volume produced in North America. We expect this percentage to double over the next five years.

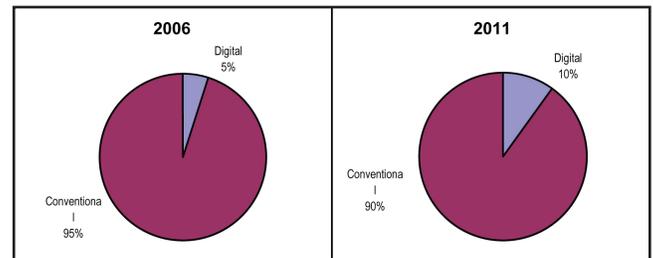


Figure 14. Digital printing share of professional book printing, 2006 & 2011 (Source: INTERQUEST)

As in other book sectors, the trend for professional books is toward shorter run lengths and faster turnaround time. The average run length produced by the printers specializing in professional books surveyed by INTERQUEST has declined by about 10% over the past two years. The demand for shorter turnaround time is an excellent driver for digital printing and gives domestic printers a competitive advantage over overseas suppliers.

In recent years image quality has become less of an issue for digital book printers producing professional books due to new high-quality cut-sheet monochrome production systems such as the Xerox Nuvera family and the Océ VarioPrint 6250, as well as new high-quality continuous-feed units such as the Océ VarioStream 9000. The ability to print high-quality half-tone images not only makes it easier for digital printers to convince publishers to adopt digital printing, it also enables printers to move into new applications.

Over the past two years most of the printers interviewed by INTERQUEST that specialize in professional books have moved into digital color printing or increased their full-color printing capabilities. Yet color printing is still a very small portion of the digital print volume produced by the respondents. Although color will grow about four times as fast as monochrome over the next few years, it will still be small portion of the respondents' total volume in 2010.

Respondents see a number of opportunities for color digital printing in scientific books and journals. Some are also considering other growth segments such as photo books, children books, "how to books," and yearbooks, while others see opportunities for spot color printing.



Market Analysis

Key Players

Thomson West and LexisNexis dominate the U.S. **legal publishing** market. International players in the legal market include Wolters Kluwers and Factiva. Other leading professional book publishers include Pearson Education and John Wiley & Sons, Inc.

Top U.S. **professional book printers** include Cadmus Communications, Integrated Book Technology (IBT), Sheridan Books, and Thomson West.

Other Promising Markets: Photographic Books

Marketing Analysis

Significant improvements in quality, cost, and workflow have been instrumental in helping make the photographic book market a promising growth sector for digital printing. Two distinct book types within this market have been impacted by digital technology — yearbooks and photo books, including memory books and calendars.

The digital production of yearbooks and photo books share a number of common requirements, including heavy duty RIPs for image processing, massive storage requirements, full-color print management, a need to maximize throughput, and flexible binding options. They also differ in a number of important ways, in particular the production work-flows.

“The workflow for photo books and yearbooks is completely different. The production is separated in our company. Photo books are almost all one-off, whereas the yearbooks are 300-400 copies.”

Digital producer of yearbooks and photo books

Over the past few years the yearbook market has been relatively flat. Growth is based on school population demographics, and student numbers have leveled off. As a result, yearbook providers have been seeking new opportunities to broaden their product offerings and grow revenue.

The North American yearbook market, which represents about \$1 billion per year in revenue, is dominated by a handful of large, well-established companies which specialize in products and services for the education market. These large players include Visant Corporation (Jostens), American Achievement Corporation (which markets under the Taylor Publishing brand), Herff Jones, and Walsworth. A number of smaller companies have also been competing in the yearbook market in recent years.

All of the respondents to the survey producing yearbooks use color digital equipment for some portion of their production. More than 90% of the digital production units they report are digital presses, and the remainder copier/printers.

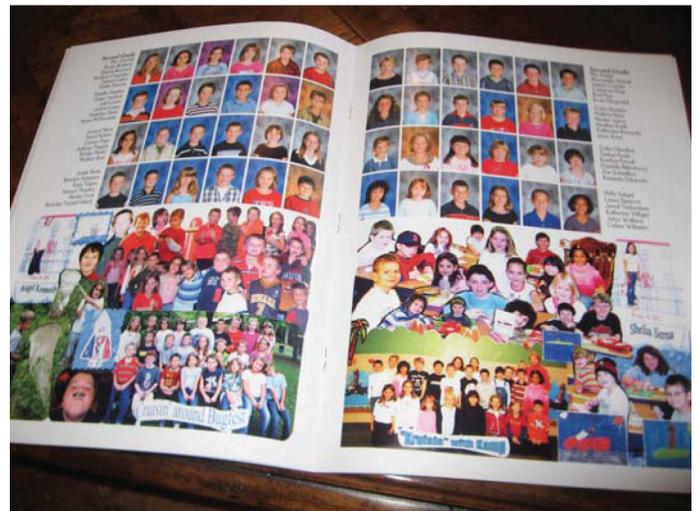


Figure 15. Full-color digital yearbook (Source: Inter-State Studio)

On average, respondents producing yearbooks forecast their overall yearbook production volume (offset and digital) will grow by a CAGR of 3%. Although their digital page volume is less than 5% of their overall production volume, respondents estimate that digital yearbook production will increase at a CAGR of 20% over the next three years.

“In my point of view, if the printer is only in digital, he will not survive. If the printer is only in offset, he will have major issues. I think the best place to be is in both technologies.”

Large commercial printer which produces yearbooks



Market Analysis

Photo Books & Calendars

A product of the 21st century, photo books are part of the photo merchandising market, which includes a growing number of photo products, including photo greeting cards, photo books, photo calendars, enlargements, stamps, and photo mugs. With the growth of digital photography, consumers are looking for creative outlets to display these digital images.



Figure 16. Digitally produced photo books
(Source: INTERQUEST)

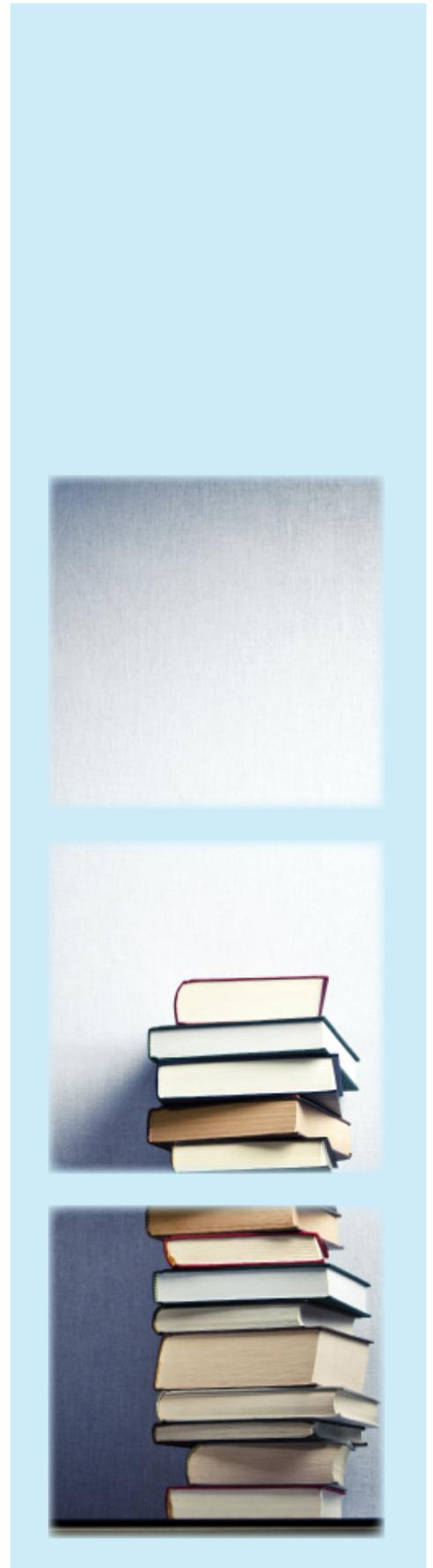
Because of their low unit production requirements (the average run length of photo books produced by survey respondents is less than two copies) and variable content, digital printing is an ideal production process for photo books and related products.

The combination of digital photography, the Internet, photo software, digital color presses, and customer acceptance of digital quality have been key drivers for photo books. Photo labs and retailers are replacing a declining 4" x 6" photo business with photo merchandise.

Today, the photo book market is primarily a consumer market. The market has grown out of the need to develop a finished product for displaying digital family photographs. Expansion to other markets such as travel, tourism and real estate will extend the market's potential for growth.

Events such as weddings, anniversary parties, and reunions which are captured with digital photography are ideal targets for photo books. Photo books enable these events to be documented with longer lasting, high quality products using new photo merchandizing options. Digital printers are also finding that these occasions are more evenly distributed over the course of a year and thus help to smooth out the peak load challenges of the holiday season.

Printing systems vendors such as Hewlett-Packard, Kodak, and Xerox are finding the growth of photo applications to be a sweet spot in the industry. These vendors are developing new solutions which include features to help further grow the market and enable customers to create value added service products.





Conclusions

•Will the growth sectors continue growing?

The four sectors examined in this report have thus far been the most fertile areas of the book market for digital providers. Digital producers will no doubt continue to mine other areas of the book market for business, but these opportunities will be limited relative to the trade, education, professional, and photographic sectors, which currently account for nearly 90% of all book sales, and about 80% of the digital volume currently produced in the book market. Of the remaining, although religious book printing has largely been cornered by offshore manufacturers, some digital providers are finding business producing religious volumes, particularly full-color editions. Long run, low-cost mass-market paperbacks, which are in decline, present relatively limited opportunities for digital providers, but the opening of the digital market to ground wood stock could modify the picture. University press books, which were not included in the survey, are another notable exception and will continue to offer solid opportunities.

Our study finds that the digital production of **photographic books** will be the fastest growing of the four sectors over the next three to four years. Even so, photo books account for only about 3% of the digital volume currently produced for books, and given the growth projections for the other sectors, will continue to remain a relatively small, albeit lucrative market.

Education books hold the most promise for digital color, personalization, and customization, with providers projecting steady annual growth in print volume of about 15%. We believe the opportunities already uncovered in this sector will continue to grow and develop and will be followed by others.

Professional books currently account for nearly as much digital volume as trade books, but this market faces a number of challenges, including a decline in library subscriptions and stiff competition from online content. Even so, providers expect respectable growth in volume, and opportunities for color are becoming available.

Trade books currently generate the most digital print volume and given the tremendous size and scope of this sector, we believe trade will continue to be a key area of growth for digital printing in the future. A number of factors examined in the context of this report are at play, including one-off editions enabled by electronic commerce and search engines, and encouraging signs that publishers are paying more attention to the supply chain. We believe that color will find increasing applicability in trade editions, and, at some point, inkjet will enter into the fray and begin capturing longer print runs.

•Growing pains

Respondents in all four digital growth sectors of the book market surveyed for this report cite an increase in competition as one of their primary challenges. As in our 2005 study, most cite cost as their major hurdle, but two years ago issues such as print quality and binding were not far behind, and very few seemed overly concerned with the competitive climate. This is probably normal given the early state of the market at that time. We have seen similar trends in other digital applications such as variable data, with technical issues beginning to give way over time to more basic considerations such as sales and competition.

We view this in a positive light. First and foremost it indicates an increase in demand, which, with a generally staid customer base such as publishers, is no small step forward. But beyond this, it indicates that other book printers are coming on board as well, and they too, have proven to be a tough lot to convince. It is also proof positive that digital printing can and is taking hold in another mainstream graphic arts market. Along from direct mail, book printing may become one of the earliest and proudest members of its trophy case.



Conclusions

•Fork in the road?

As the digital book manufacturing market develops, one aspect of it which has come into sharp contrast is the vastly different approach which has been taken by a handful of one-off providers such as Lightning Source compared to most of the rest of the providers (including established players) which have adopted short- run programs. Given the nature of one-off production, it is not surprising to see a small number of participants taking this route. One-off production requires a great deal of investment in IT infrastructure in order to consolidate a very large number of orders and produce them efficiently. A business model like that would scare the pants off of many book printers.

On the other hand, Lightning Source's success surely has the short-run players scratching their heads, and is food for thought for other book printers who are thinking about adopting digital printing. Lightning Source's numbers—1.2 million books produced each month with a 1.8 copy average run length—are certainly resonating with publishers. The real question is how large the one-off market can become and whether it will begin enticing other providers to approach it in a serious way.

•Where now?

The survey conducted for this study finds strong evidence that publishers are finally beginning to step up to digital printing. For many, these steps are tentative, but progress is progress. The next question is where they will go from here. What is the next logical evolution for them in the use of digital technology? Is there one? One would think, and hope, that they would continue hammering away at the economics of their supply chain and incorporate digital book manufacturing to a greater degree. Yet they have a lot on their plates at the moment, so providers and suppliers will probably have to continue pushing aggressively. We doubt a dramatic tipping point will occur anytime soon. Instead, the market will continue to evolve in steady, but unspectacular stages.

•Where is inkjet?

If any technology has the potential to provide a tipping point in the book market it is probably inkjet. The average length of short- run jobs produced digitally by book providers is increasing, and more importantly, digital book providers are eager to go after longer runs. They know many books are produced in quantities that are currently just beyond the reach of toner in terms of cost, but not beyond the capabilities of digital technology in terms of speed and throughput. There is, in other words, a great deal of real estate between Harry Potter and Lightning Source. We believe this is the area inkjet will eventually exploit—sooner rather than later.

•How far can color go after the low-hanging fruit is picked?

Although color digital printing is and will remain in the near term a very small portion of digital book printing, providers exhibit a great deal of enthusiasm over it. Respondents to our survey expect digital color to grow at a much faster pace than monochrome.

In our 2005 study of the market we noted an emerging shift in the use of digital color from book covers to book blocks. This trend continues across all segments. In the education book market, digital presses are now being used to produce entire full-color textbooks, and this equipment is opening up new opportunities for professional book printers as well.

The trade book market, which is largely characterized by monochrome book blocks (particularly the adult portion), also offers opportunities. The quality of print produced by recent digital presses is in many cases good enough to produce the color inserts commonly found in non-fiction books. Digital color presses are also being used in the U.S. to produce short- runs of full-color children's books—a market which in recent years has gone offshore.

•Don't look back...

Conclusions

Although Xerox continues to lead the digital book market in system installations, challengers are gaining ground. Océ's 2006 launch of the VarioPrint 6000 family finally placed it in a position to challenge Xerox in the cut-sheet market and it is clearly making headway in monochrome book production. HP Indigo is giving chase with its color systems. As could be expected, the heightened competition is helping book printers lower their production costs.

Xerox and HP Indigo dominate the digital color market for books. According to our survey HP is leading in the trade and yearbook segments, while Xerox dominates in the education and professional books sectors.





Glossary of Terms

AAP: Association of American Publishers.

Back List: Generally refers to books that are not newly released but kept in stock to meet anticipated future demand (versus new titles).

BISG: Book Industry Study Group.

Book Block: The bound pages of a book to which a cover is applied.

CAGR: Compound Annual Growth Rate.

Consignment: Distribution arrangement whereby a dealer pays only for what is sold and can return unsold goods. See also “Returns.”

Continuous Feed: Web-fed printer.

Cost-per-page: Cost per impression produced on digital printing equipment, usually understood to only include consumables (excluding paper), but not maintenance and equipment acquisition. See also “TCO.”

Coursepack: Generally collected reading material used as a supplement or alternative to conventional textbooks.

Customization: Producing relatively short runs of identical documents for geographic or demographic purposes. See also “Versioning.”

Cut Sheet: Generally refers to letter-size, legal, and ledger-size paper. Sheets larger than 17” x 22” are called folio sheets.

Digital Press: A digital printing system generally targeted at commercial printing applications but also used for full-color transactional printing. Digital presses generally cost more, have higher duty cycles, and require a higher skill level to operate than production copiers.

eBook (Electronic Book): Book or manual stored and read on a computer, portable device, or dedicated electronic reader.

EI-Hi: Elementary and High School (grades K through 12).

English as a Second Language (ESL): English language training for individuals whose first

language is not English.

Front List: Generally describes recently-released titles (usually less than one year).

Full (Process) Color: Color printing using subtractive color secondaries (cyan, magenta, yellow) plus black. Black is necessary because impurities in pigments prevent an equal combination of cyan, magenta, and yellow from absorbing the entire color spectrum and producing a pure black.

Grayscale: Stepped or continuous range of gray values from highlight to shadow.

Groundwood: Mechanically-pulped paper.

Halftone: Binary image in which any of the shades of gray or color between the lightest and darkest parts of an image are represented by dots varying in size and frequency.

Higher Education: education beyond grade 12.

Mass Market Books: Books produced for consumption in large numbers and often distributed in supermarkets, drug stores, and other retail outlets for the general public.

No Child Left Behind Act of 2001 (NCLB): U.S. federal law (PL 107-110) intended to improve primary and secondary schools by increasing the standards of accountability for states, school districts, and schools. The legislation provides more resources for schools and increases the flexibility of states and local agencies in using federal education funds.

Offset Press: A device that uses a two-step transfer of ink from a flexible printing plate onto a rubber-coated blanket and then through pressure onto paper.

Perfect Binding: Binding method commonly used for soft cover books which involves milling or roughing the binding edge of the book block to promote glue penetration before a soft wraparound cover is applied.

Personalized Printing: Incorporation of variable elements to make a printed piece more relevant for the recipient.

POD: Print-on-Demand. Printing the quantity



Glossary of Terms

when needed (versus printing to inventory). In the context of digital book production, on-demand print runs generally entail one to 50 units.

Pre-Adoption Book: New editions of textbooks submitted for state approval and adoption. See also “Textbook Adoption.”

Professional Books: Books related to a profession or professional topic.

Returns: Unsold books returned to publishers by distributors, and eventually discounted or destroyed at the publisher’s expense. See also “Consignment.”

Self-Publishing: When a book is designed, printed, and distributed by and at the expense of the author.

Service Bureau: Company that provides prepress and electronic output services such as scanning, film preparation, and color printing.

Short Run: Relative expression of the length of print job. In the context of digital book production, short runs generally involve producing more than 50 units.

Spot Color: Printing various shades or gradations of a separately specified color of ink (as opposed to using process color primaries to produce a variety of colors). Often used interchangeably with “highlight color.”

STM: Scientific, Technical, and Medical.

TCO: Total cost of operation. Cost per impression produced on digital printing equipment, including consumables (other than paper), maintenance, and equipment acquisition. Although a thorough analysis would also include labor and overhead, there is no industry standard for calculating TCO.

Teacher’s Editions: Special editions for instructors containing resources to supplement student textbooks.

Textbook Adoption: The process used by 21 states in the U.S. to determine the El-Hi textbooks that can be used by schools and districts. States other than the 21 using the textbook adoption process do not adopt K-12 books on a statewide basis.

Throughput: Characterizes a printer’s ability to complete a job in a given time—the actual rate at which printing occurs, not necessarily synonymous with rated speed.

Trade Book: Any title that is not educational or scholarly in nature.

University Press: Non-profit organization which publishes and disseminates the results of scholarly research and writing. University presses are usually partially underwritten by their parent organization.

Versioning: Producing relatively short runs of identical documents for geographic or demographic purposes. See also “Customization.”

Workflow: A series of prescribed steps with inputs and outputs.

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