GLOBAL BOOK ALLIANCE

Trainer's Guide

Module 4: Printing

Save the Children · Norad · ALL CHILDREN READING: A GRAND CHALLENGE FOR DEVELOPMENT · GPE Transforming Education · Foreign, Commonwealth & Development Office · United Nations Educational, Scientific and Cultural Organization

code · World Vision · USAID · THE WORLD BANK · ADEA Association for the Development of Education in Africa · unicef

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Acknowledgements

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The GBA strives to ensure that books are available, appropriate, affordable, and accessible to all, recognizing that high-quality reading materials are critical to ensuring that all children can learn to read and read to learn in languages they understand.

The GBA training modules aim to provide guidance to help various stakeholders improve book supply chains in their contexts to make this vision a reality.

Acronyms and Abbreviations

BSC	book supply chain
CMYK	cyan, magenta, yellow, key (black)
DPI	dots per inch
ERM	essential reading materials
EVA	ethylene vinyl acetate
GBA	Global Book Alliance
GSM	grams per square meter
LMIC	lower and middle-income countries
MoE	Ministry of Education
NGO	nongovernmental organization
PDF	portable document format
PPI	pixels per inch
PPT	PowerPoint presentation
PUR	polyurethane reactive
RFQ	request for quotation
VAT	value-added tax
WFU	wood-free uncoated paper

Glossary of Terms

Term	Definition
Bleed or bleed box:	Extension of artwork 1/8” (3 mm) beyond the actual dimensions of the document to avoid strips of white on edges of print when cut to size.
Coldset:	A traditional printing method. A newspaper press is a web machine that does not need a dryer to cure the ink.
Essential reading materials:	Decodable, leveled, and supplementary readers are collectively described as essential readers. All are required elements for reading acquisition, but each plays a different role.
Flex test:	Measures the strength of the page by “flexing” it back and forth.
Four-page split rule:	The total number of inside pages should be divisible by four.
Heatset:	Similar to coldset but is equipped with a dryer which makes it possible to print on any kind of paper (also coated) of high quality.
Gravure:	A method of printing where the image is engraved into the printing plate, creating recesses for the ink.
Offset:	A printing process which transfers the inked image from the plate to a rubber sheet, then on to the printing surface.
PDF files:	Portable Document Format (PDF); electronic image capturing all elements of a printed document.
Perfect binding:	Binding used for softcovers and includes three processes which include gathering, binding (gluing), and trimming.
Plate:	Impression forms, which are the element that transfers the printing ink to the paper.
Pull test:	Measures the strength of the page binding perpendicular to the spine.
Preflight of PDF file:	Software-based process to check if PDF files are ready for use by printer.
Proof:	First copy of a printed work, showing the definitive content.
Ready-to-print file:	File that has met all necessary specifications/clearance to produce a high-resolution output.
Saddle stitching:	A very popular book binding method in which folded sheets are gathered together one inside the other and then stapled through the fold line with wire staples.

Term	Definition
Section sewing:	Sections of pages, or signatures, are sewn together before perfect binding.
Sheetfed printing:	Sheets of paper are fed into the printer, manually or continuously, but are cut as needed, and then folded to make the signatures.
Signatures:	The configuration that a printer uses to lay out book pages on a press sheet in order to fold into a book. Print signatures are a group of pages that are printed on both sides of a sheet of paper. The page count in all print signatures is always in multiples of four.
Spiral binding:	Comb, wire-o, and coil-binding pages are held together by wire or plastic coil that runs through a series of holes punched along one side of a book.
Startup waste requirements:	The cost of printing and cleaning solvents, as well as the safe removal of these potentially hazardous agents.
Trim marks:	Trim marks (sometimes called cutting marks) are short lines placed in the corner of pages to show the printer where to trim the paper.
Web machine:	Web machines print from roll to sheet and include the folding of the paper during the same process.
Web offset printing:	A continuous feed of paper which is cut at the end of the print process. Both techniques transfer the inked image from the printing plate to a rubber sheet, then on to the printing surface (two types).

List of Materials

SESSION	MATERIALS
1. Introductions and Training Objectives	1. Notecards 2. Flip charts and markers
2. What is the Role of Printing in the Book Supply Chain?	1. Several sets of 5 strips of paper, each containing the various steps in the print production process: file approval, plate making, printing, binding, packing 2. Handout 1: Printing Options 3. Signatures 4. Examples of print-ready files, hard proofs 5. Plates, impression forms 6. Different types of bound books
3. How to Ensure Ready to Print Files	1. Post-it Notes 2. Examples of Print-Ready files 3. Handout 2: Ready to Print File Checklist 4. Handout 3: Sample Preflight Report 5. Preflight software/tool 6. Flip charts and markers
4. Printing and the Factors Influencing Book Manufacturing	1. White samples of different paper grades 2. Printed sheets
5. Binding Options	1. Signature and covered samples 2. Video on the different types of stitching 3. Examples of saddle stitching, perfect binding and section sewing. 4. Different types of spiral binding. (wire-o, comb, coil) 5. Cardboard boxes for packing – highlighting carbon footprint and secure shipping characteristics
6. General Information on the International Book Supply Chain Market	1. World map of book printing – to include high-volume exporters, countries with self-sufficient capacities, countries lacking production capacity, found in the PPT. 2. Handout 4: Case Studies 3. Flip charts and markers
7. Wrap up and Reflections on the Workshop	1. Flip charts and markers 2. Handout 5: Evaluation Questionnaire

Introduction

The purpose of the book supply chain (BSC), as it pertains to textbooks and essential reading materials (ERM), is to ensure that every child has the critical tools she/he needs to learn to read. Reading and literacy play an important role in helping a child develop the skills needed for improved economic and health outcomes and for her/his own civic advocacy. It is important to give children access to books as well as time to engage in guided independent reading. Reading should include a variety of genres and levels of difficulty roughly matching each child's interests and abilities. Providing this kind of access has been directly tied to children gaining better vocabulary, fluency, and comprehension skills.[1]

The BSC consists of several key functions that play essential roles in increasing children's literacy by ensuring sufficient access to appropriate reading materials (see graphic below). The primary components of the BSC are planning and forecasting, title development, publishing, printing, procurement and purchasing, distribution management, and active use. Each phase is executed by a variety of actors (government, private sector, and private citizens) who must collaborate to create a functional, cost-effective BSC.

The book industry is essential in ensuring that the "right books are made available at the right time to all children."[2] A vibrant book publishing industry is key in making available quality, relevant, and appropriate early grade ERMs (decodable and leveled readers, as well as supplementary reading

[1] http://teacher.scholastic.com/products/pdfs/Intro-From-Striving-To-Thriving.pdf?eml=TSO/eb/20170920//TW/ST/AD//&linkId=43071495; Harvey, S. and Ward, A. 2017. From Striving to Thriving: How to Grow Confident, Capable Readers. New York: Scholastic

[2] Burns, M. S., Griffin, P., and Snow, C. E. (Eds.). 1999. Starting out right: A guide to promoting children's reading success. Washington, DC: National Academy Press.

materials), and textbooks. The industry also has the responsibility to produce books that are available in multiple means of representation to be accessible to all learners, in all their diversity, with books available in print, Braille, audio, and sign language storybook formats. If there are not enough of these materials available to children and these materials are not accessed and used effectively, learning will suffer.

The print industry is a key link in the BSC. A publisher is generally responsible for the processes of authoring, editing, designing, illustrating, and laying out the pages of a book, producing final print-ready PDFs to send to the printer. Printers take the print-ready PDFs and produce the physical books, working closely with the publishers on important decisions around issues of type of paper, formats, binding, and finishing, which determine the optimal use, durability, and cost of the books. Printers often coordinate with distributors to ensure on-time delivery of materials to schools as well as other outlets such as libraries or bookshops.

This module is the fourth in the BSC series and focuses on the role of printing in the realization of book projects and helps those participating in the BSC to acquire the minimum knowledge required to guarantee the proper execution for printing. It is essential to know the basics of printing techniques and printing machine operation to understand issues around the expected quality of the finished product, as well as challenges related to meeting deadlines. Without an understanding of the printing process, it is difficult for stakeholders in the BSC to make informed decisions on formatting books, determining the technical specifications appropriate to the target learners, and to plan properly to have books ready for deadlines, such as the start of a school year.

Recent supply chain analyses conducted in Zambia, Malawi, Nigeria, Cambodia, and Tanzania have revealed similar challenges in the printing industry: The lack of coordinated and long-term planning for book printing and publishing creates difficulties for printers, who must plan their resources (as paper has a lead time), staff, and equipment to be able to respond effectively to demands; tax systems that impose duty taxes and value-added tax (VAT) on raw materials such as paper, machinery, and ink, but not on printed books, cripple the printing industry; international printers have the benefit of economies of scale that allows them to print more inexpensively, so that often local printers cannot compete.

This module contains activities to engage participants and to ensure that the topics covered are well understood. References are also provided at the end of most sessions to help participants deepen their knowledge of technicalities that could not be covered during the training.

This module explains the following basic printing functions:

1. Print manufacturing in the book supply chain
2. Creating ready-to-print files
3. Creating signatures to ready book for binding
4. Printing and the different factors involved in children's book manufacturing
5. Binding and the different types involved in children's book manufacturing

These five functions represent the standard requirements used by printers to provide quality, relevant, appropriate, and affordable essential and supplementary reading materials. Whether the firm is a large one with many employees or a small venture with just one or two people, the functions are consistent throughout the industry.

By the end of this module, participants will be able to:

1. Describe the process for the production of essential and supplementary reading materials
2. Articulate the advantages and disadvantages between international and local printing
3. Describe the basic steps in the printing and binding process, how to plan printing and binding lead time, and avoid unwanted costs
4. Articulate the steps to planning a book supply with optimum lead time and costs and sufficient forward-planning

Notes on Using This Module

How to Use This Module

This module is for trainers as they prepare for and carry out the training. Trainers should review the material in this module and in the accompanying PowerPoint presentation (PPT). The presentation has been created from the content in this module, but it does not contain all the content. Therefore, it is important that trainers read through the Trainers' Guide in full and master the content before the training. The presentation can also be adapted and added to by trainers as they prepare to conduct the training.

Module Organization

Each session is broken down as follows:

- **Rationale:** Explains why the material in the session is important. Trainers should read and fully understand the rationale in order to present the content of the session well.
- **Objectives:** These should be presented briefly at the start of each session.
- **Time Breakdown:** This guides the trainer to ensure the training stays on time
- **Materials:** Include all materials needed to complete the session.
- **Preparation:** This highlights planning tasks that the trainer must do prior to conducting the training.
- **Procedure:** This section tells the trainer how to present the content and the activities that follow.
- **Content:** The content for each session is broken down and labeled throughout the session. The activities and the content make up the heart of the session.
- **Activities:** These are designed to make the training as participatory and interactive as possible. Trainers are encouraged to adapt these to fit the training context.

Participants

Participants for this module, as with all modules in this series, will vary. However, the training is aimed at staff throughout the Ministry of Education (MoE) and others in the BSC, such as publishers, printers, procurement, and distribution specialists. It is also relevant for those involved in training teachers and those responsible for developing strategies for working with parents and communities. The training is also aimed at United States Agency for International Development (USAID) education team staff and implementing partners and staff from other donors.

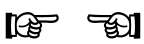
Sample Agenda

Session #	Session Name	Description	Time (mins)
1	Introductions and Training Objectives	Paired introductions; slide presentation; sharing expectations	30
2	What is the Role of Printing in the Book Supply Chain?	Slide presentation; group activity	45
3	How to Ensure Ready to Print Files	Slide presentation; group activity	45
4	Printing and the Factors Influencing Book Manufacturing	Slide presentation; group activity	45
5	Binding Options	Small group work; large group debrief, video role play and discussion; book planning activity, slide presentation	35
6	General Information on the International Book Supply Chain Market	Slide presentation; group activity practicing different types of folding	50
7	Wrap Up and Reflection on the Workshop	Individual reflection and sharing, module evaluations	35

Session Time (Total): 4 Hours and 45 minutes

Legend

The following symbols are provided to assist trainers as they plan for and conduct each session in this module.

Icon	Description
	***Rationale***—each session has a rationale that provides the basis for the activities and links it to prior and subsequent sessions
	***Objectives***—action-oriented objectives are stated for the module as a whole and for *each* session
	***Duration***—time allocation for each session. Includes a *time breakdown* which divides the session into various components to help with timing during sessions
	***Preparation***—highlights planning tasks that must be done by the trainer PRIOR to the training
	***Materials***—lists the materials necessary for the trainer to use during each session
	***Procedure***—outlines for the trainer the facilitation process to be used in each session
	***Content***—presents key content to be address during each session
	***Activity***—highlights a task to be carried out by the participant(s)
	***Trainer's Notes***—to be used by trainer in the planning and carrying out of each session
	***Handout***—indicates that the trainer should distribute a photocopied document to participants

Session 1: Introductions and Training Objectives

Rationale

At the outset of the workshop, participants and the training team have the opportunity to get to know one another, establish a positive and collaborative working environment, and discuss workshop ground rules. Participants will also share their expectations for the workshop and go over the objectives of the workshop.

(See the **Supplementary Activity** at the end of the session for more information to share with participants on the BSC.)

✓ *Objectives*

Upon completion of the activities of this session, participants should be able to:

- Outline key administrative matters and the agenda for the workshop
- Articulate the shared ground rules for behavior during the workshop
- Share the objectives for the training

Duration: 30 minutes

Time Breakdown

Activity 1.1—Partner Introductions	10 minutes
Administrative Matters, Agenda, and Ground Rules	5 minutes
Activity 1.2—Sharing Expectations	10 minutes
Workshop Objectives	5 minutes
Supplementary Activity (optional)	(10 minutes)
Total:	30 or 40 minutes

	Materials— 1. Notecards 2. Flip charts and markers

Getting Started

Procedure

Present the material below and carry out **Activities 1.1—Partner Introductions** and **1.2—Sharing Expectations**.

 ***Content***

Activity 1.1—Partner Introductions (10 minutes)

Conduct an activity to have participants introduce themselves. Make the activity as active as possible. For example, have participants stand in a circle; ask them to walk directly across the circle and pair-up with someone they have not interacted with before. Give them three minutes to get to know each other using prompts such as*: find one thing you have in common*; *share one thing no one else knows about you*, or any other quick ice breaker. Then ask them to introduce each other to the larger group.

Administrative Matters and Agenda Review

Explain to participants any logistics and administrative arrangements for the workshop and share the agenda for the day using the PowerPoint presentation (Slide 5) or printed copies of the agenda.

Workshop Ground Rules

Develop ground rules for the workshop; they should include the following (Slide 6) plus any other rules agreed upon by the group.

Workshop Ground Rules

1. No side conversations
2. Telephones must be silenced
3. Participants and trainers **all** have the responsibility of ensuring that sessions begin and end on time
4. Respect the viewpoints of others and allow everyone the chance to speak. Remind those who like to participate to allow more reserved members to provide their feedback since everyone has something to contribute for the benefit of others in this workshop

Ask participants if they accept the proposed rules and if they will commit themselves to them for the duration of the training.

Expectations

Invite participants to carry out **Activity 1.2 – Sharing Expectations** (Slide 7).

Activity 1.2 – Sharing Expectations (10 minutes)

It can be valuable for both participants and the trainer if participants share the expectations with which they arrive at a course. Spend 10 minutes having participants share their responses to the following prompt: *When you were invited to this training, how did you think you might benefit from it; what are you hoping to learn or gain through the training?*

Go around the room asking for volunteers to share their expectations. Capture participants' contributions on flip charts and tell participants you will return to the expectations at the end of the training.

Training Objectives

Present the objectives for the training (Slide 8) and take any questions from participants.

Training Objectives

By the end of this module, participants will be able to:

1. Describe the printing process to produce essential and supplementary reading materials
2. Articulate the difference between international and local printing
3. Describe the basic steps in the printing and binding process, how to plan print and binding lead time, and avoid unwanted costs
4. Articulate the steps to planning a book supply with optimum lead time and costs and sufficient forward-planning

Supplementary Activity (10 minutes)

If time allows and the BSC is a new concept to participants, take an additional 10 minutes at the beginning of the session to introduce the BSC by:

- Showing the following video that explains what the BSC is and why it is important: https://youtu.be/9XMkNnaaBZ8 (Slide 9)
- Sharing the following diagram found in the slides to provide an overview of the BSC. You may also ask participants to note if the supply chain for books in their country is similar to this one or how it may differ

Lead a brief discussion with participants on where they see the biggest challenges in the BSC in their country context.

Session 2: What is the Role of Printing in the Book Supply Chain?

Rationale

Before detailing the different stages of the manufacturing process for essential and supplementary readers, it is important to understand the role of printing in the BSC. To understand subsequent sessions, participants are provided an overview of the process, technologies, and machines used, as well as the necessary materials to start production.

✓ *Objectives*

Upon completion of the activities of this session, participants will be able to:

- Define the print manufacturing process
- Describe what is required to start production

Duration: 45 minutes

Time Breakdown

Steps in the Production Process	15 minutes
Activity 2.1 – Reviewing the Steps of the Production Process	10 minutes
Print Technology and Machines	10 minutes
Activity 2.2—Q&A on Technology and Machines	10 minutes
Total:	45 minutes

	Materials— 1. Several sets of 5 strips of paper, each containing the various steps in the print production process: file approval, plate making, printing, binding, packing 2. Handout 1: Printing Options 3. Signatures 4. Examples of print-ready files, hard proofs 5. Plates, impression forms 6. Different types of bound books

Preparation

Prepare materials for **Activity 2.1—Reviewing the Steps of the Production Process** which will consist of several sets of five strips of paper, each containing the steps in the print production process: file approval, plate making, printing, binding, packing. The number of sets will depend on the number of participants and how they will be grouped together. Each group will receive one set of strips.

Print **Handout 1: Printing Options** for each participant and distribute after completion of Activity 2.1.

Steps of the Production Process

Procedure

Using Slides 10-20, present the material below. Take care to define any terms that may be new to participants. After presenting the material, show participants how a book signature is created by showing them the graphic on Slide 20 and show the video here, emphasizing the section at 5:40, which displays how signatures are printed: https://www.youtube.com/watch?v=avXkRLoSta8

Take any questions or comments from participants. Once all questions are answered, put participants in small groups for **Activity 2.1—Reviewing the Steps of the Production Process** (Slide 21).

Content

The role of printing in the book supply chain is the actualization of a book. While publishers acquire books as ideas, putting together stories and graphic illustrations, printers make the book into a physical learning material. The materials needed and the steps that a book manufacturer goes through to print a book are complex. Once the content of the book is approved, it is formatted for printing onto paper to create a book for a child to hold in their hands. The printing process is important in the realization of book projects. Stakeholders in the BSC need the minimum knowledge required to guarantee the proper execution for printing. Without a thorough understanding of the printing process, it is difficult to make informed decisions on formatting the stories, determining the technical specifications appropriate to the target learners, and to plan properly to have the books ready for deadlines such as the start of a school year.

It is important to know the basics of printing techniques and printing machine operation to understand issues around the expected quality of the finished product as well as challenges related to meeting deadlines. With the right knowledge of the printing process, stakeholders will ensure that the story will be engaging and developmentally appropriate for young learners with the best font size for the type of book and reader, the correct size to fit in small hands, or to be big enough to be read and shared with a group of learners. With the right fit of a book, children will be able to focus fully on the story on the page and engage with reading.

Print Manufacturing – Start to Finish

Manufacturing is the production of books or educational materials in a broad sense, starting with the provision of content in the form of ready-to-print files. A printing company will need to have all the raw materials needed, such as paper, ink, glue, etc., and also plan the production capacity required to produce the books. Once the production of books is finalized, the printer will often pack in boxes and deliver as requested by the publisher, MoE, or partner who has contracted the printing services.

Materials Required for the Start of Production

To start purchasing raw materials, the printer will require a purchase order or a contract from the procuring entity. Raw materials account for 50–60 percent of the production cost of a book and often need to be ordered according to the book's technical specifications. It is therefore important for the printer to order raw materials at the time of each confirmed order. A timeline has been included as part of **Activity 2.1**.

☞ ☜	***Trainer's Notes***—Note for participants that information on purchase orders, contracts and general procurement and purchasing of printing services is covered in the **Procurement and Purchasing Module.** Encourage participants to look at that module to learn more.

The Production Processes

After the client provides the purchase order and print-ready files (see **Session 3: How to Ensure Ready to Print Files**), the subsequent steps are:

1. **File approval**: The electronic transfer of files or the use of incompatible software can cause files to corrupt and/or lose text or images. To avoid printing incorrect content, the printer will process the files through a color separation system to generate "plate making-ready files." These can be printed on proofing paper (called a "hard proof") and/or sent to the client in a book sample for review.

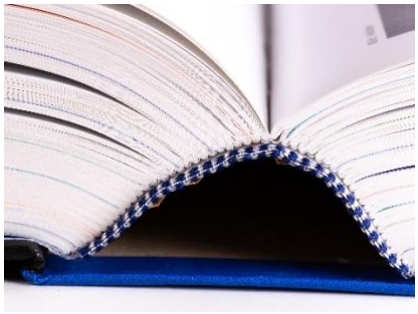
   Another practice which has become standard in the industry to gain time is to send proofs electronically (called a "soft proof"). Whichever format used, the client should compare the original files with the printer's files and either provide written approval of the files or notify the printer in writing of any discrepancies and request updated proof for approval.

   The file approval process can be time consuming and complicated. The process is easier when books are produced locally due to proximity if industries are well established.

2. **Plate making:** Once the files are approved, the printer will make the plates which are called impression forms. These are the elements that transfer the ink to the paper. The plates are inserted into the printing press to print. The plate-making process takes one to two days to complete. The two processes will be explained in detail in **Session 4: Printing and the Factors Influencing Book Manufacturing**.

3. **Printing:** Printed sheets are folded to make the signatures, which is the configuration a printer uses to lay out book pages on a press sheet in order to fold in the correct order. (See below in **Session 4**)

4. **Binding:** The signatures are gathered, sewn, and perfect bound by gluing the cover on the gathered signatures (signature block). They can also be stapled using a process called saddle stitching (more on binding in Session 5).



Perfect binding

Saddle stitch

5. **Packing:** Finished books are carefully packed in carton boxes for secure storage and transportation. This is where book manufacturing ends. Often the procurement of printing services includes the work of distributing the books to their requested delivery sites. Signed delivery notes confirm that the books have reached the intended readers.

Activity 2.1—Reviewing the Steps of the Production Process (10 minutes)

Place participants in small groups. Ask them to select one facilitator and one spokesperson. Give each group one of the shuffled stacks of strips of paper with descriptions of steps in the production process.

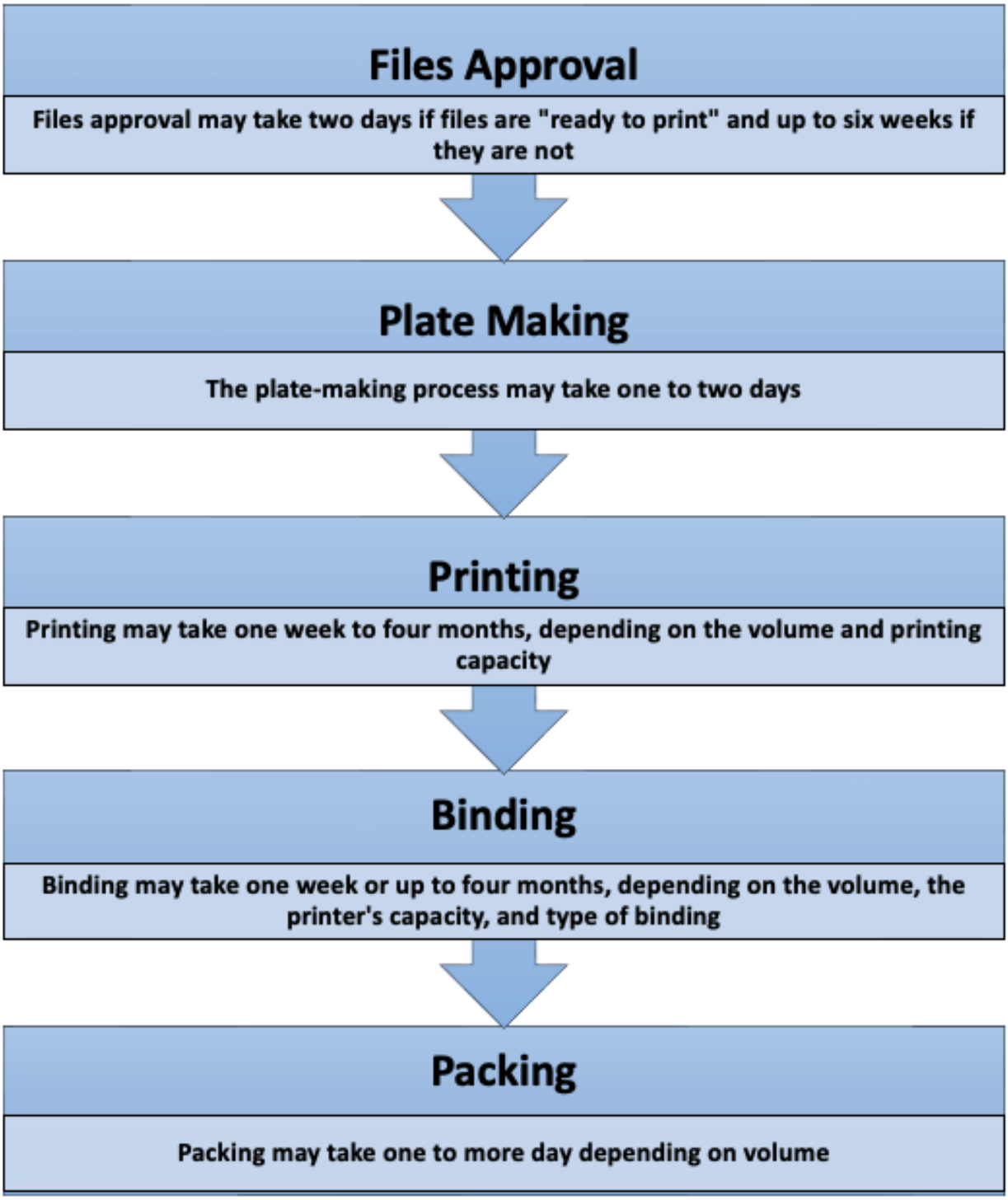
Ask them to sort the stack to reflect on the order of the process you have just presented. Ask:

- *What challenges might arise at each stage of the production process, and how might those challenges be avoided?*

Note the suggested timelines for each step in the process. Some of the times could potentially cause a very long delay, such as binding, which could be done in one week or take up to four months.

- *What decisions could be made at each of these steps to minimize the time needed? What challenges to the budget, logistics, and learning at schools could be caused by the delays?*

Give groups five minutes to complete the task, followed by one minute to present their work. Group presentations and discussion should focus on responding to the questions provided. The organization of the steps will be provided and does not need to be presented by groups. Once all groups have presented, show the slides again and review the steps as listed below:


Files Approval
Files approval may take two days if files are "ready to print" and up to six weeks if they are not
Plate Making
The plate-making process may take one to two days
Printing
Printing may take one week to four months, depending on the volume and printing capacity
Binding
Binding may take one week or up to four months, depending on the volume, the printer's capacity, and type of binding
Packing
Packing may take one to more day depending on volume

Print Technology and Machines

Procedure

Using Slides 22-23, present the material below. Take care to define any terms that may be new to participants. Take any comments or questions from the participants, and once all questions are answered, conduct **Activity 2.2—Q & A on Technology and Machines** (Slide 24)**.**

Content

Ninety-five percent of the global book supply is printed in offset, a process which transfers the inked image from the plate to a rubber sheet, then on to the printing surface. Printing is carried out using one of three different machine types. The choice of printing machine does not affect the durability of a book.

The table below adds more information on the types of printing:[3]

Number of Copies (approximate)	1-1,000	1,000-15,000	15,000+		100,000+
Type of printing	**Digital**	**Sheet fed**	**Heatset web offset**	**Coldset**	**Publication gravure**
Production method	Use plate-less, toner-based printing devices. Digital information printed via ink cartridges directly onto paper.	Ready-made sheets go directly into the press.	Intermediate rubber blanket is used to transfer printing ink to paper surface. The inked printing plate transfers ink to the blanket, which then applies ink to paper.	Intermediate rubber blanket is used to transfer printing ink to paper surface. The inked printing plate transfers ink to the blanket, which then applies ink to the paper.	Use copper cylinders to print on paper. The images are engraved or etched into the cylinders creating recesses for the ink. Then the paper is pressed to transfer the image.
Characteristics	- Limited paper options - Higher per unit cost	- Coated and uncoated stock - 28 gsm to 350 gsm - Ideal for covers	- Headset utilizes drying lamps or heaters to cure or "set" the inks - Coated, uncoated, mechanical, or newsprint - 40 to 200 gsm	- Ink dries through absorption into paper - Ink can smudge so mostly for newspapers - Only uncoated paper	- Cylinders last a long time and require less maintenance making it suitable for high volumes - Good quality on lower quality paper, coated or uncoated -32 to 115 gsm

[3] USAID. 2014. Best Practices for Developing Supplementary Reading Materials. https://pdf.usaid.gov/pdf_docs/PA00JV69.pdf

Number of Copies (approximate)	1-1,000	1,000-15,000	15,000+		100,000+
Print Times	Variable	On average 8,000 sheets, one side printed per hour	On average 25,000 signature per hour	On average 25,000 signature per hour	On average 35,000 signature per hour
Set Up Time	Set up time is a few minutes per signature	Set up time is one hour per run	Set up time is 2 hours per signature	Set up time is 1.5 hours per signature	Set up time is longer, 3 hours per signature
Indicative prices for a 200 x 270mm, per 16-page signature	Variable - from US$1 to $15 per book	US$ 0.015	US$ 0.008	US$ 0.004	US$ 0.006

☞ ☜	***Trainer's Notes***—The table above is provided as **Handout 1** and should be provided to participants.

The following types of machines are for binding:

- **Saddle stitcher** or **wire stitcher** is used for books less than 96 pages and less than 6-12 months of use.
- Perfect Binder **without sewing** - the sewing process is very slow and has been replaced successively in Europe by Polyurethane Reactive (PUR) glue, which is faster, cheaper and provides the same book strength.
- **Spiral or wire-o binders** are used in cases where the book needs to be displayed, in a classroom for example.

✍ Activity 2.2—Q&A on Technology and Machines (10 minutes)

Show Heatset process video: "How Offset Printing Works"
https://www.youtube.com/watch?v=5LMU-zB8Sro

Give 5 minutes for participants to raise questions on technology and machines as well as anything else you have discussed in the session.

Session 3: How to Ensure Ready to Print Files

Rationale

Many book projects experience losses and delays because files sent to the printers are not ready to print. This means corrections and re-approvals need to be made when the books should already be being printed. This session introduces basic tools like a file checklist or a preflight system that can be used to avoid these issues.

✓ *Objectives*

Upon completion of the activities of this session, participants will be able to:

- Describe processes and tools to ensure that files received from a publisher or a design/editorial team are ready to print
- Understand the importance and requirements of ensuring files are ready to print to avoid delays or other losses

Duration: 45 minutes

Time Breakdown

Compliance with Prepress Guidelines	5 minutes
Activity 3.1 – Why Complying to the Prepress Guidelines is Important	10 minutes
Ready to Print File Checklist and Preflight	15 minutes
Activity 3.2 – Running and Reading a Preflight Report	15 minutes
Total:	45 minutes

	Materials— 1. Post-it Notes 2. Examples of Print-Ready files 3. Handout 2: Ready to Print File Checklist 4. Handout 3: Sample Preflight Report 5. Preflight software/tool 6. Flip charts and markers

Preparation

Prepare a set of flip charts to attach the Post-it Notes to. Ensure you have the appropriate technology ready to run print-ready files through the preflight tool and display the report using the projector.

Print **Handout 2: Ready to Print File Checklist** and **Handout 3: Sample Preflight Report** for each participant.

Compliance with Prepress Guidelines

Procedure

Use Slides 25-27 to present the material on compliance with prepress guidelines to the participants. Take care to define any terms that may be new to participants. Take any questions or comments from participants. Once all questions are answered, do **Activity 3.1—Why Complying with Prepress Guidelines is Important** (Slide 28).

Content

Compliance with the prepress guidelines (the activities to be done to prepare for the printing process) is important for two main reasons. First, it guarantees that the printing will be of the highest quality in image, text reproduction, and color matching. This is provided that adequate bleeds and trim marks are used.

- **Bleed** is artwork that is extended beyond the dimensions of the document. It is used to avoid strips of white paper showing on the edges of your print when cut to size. Printers cut large stacks of paper at a time, and there may be movement within the sheets (meaning the actual cut may deviate from the trim marks slightly). Bleeds of 1/8'' (3mm) are required for all files. The **bleed box** extends past the page-cut marks, to make sure that the color extends past the edge of the page, with no margin showing in the final print.
- **Trim marks** show where pages are cut. The line should extend 1/16" (1.5 mm) beyond the desired dimensions of the document to ensure cutting does not occur within the desired dimension.

Secondly, when certain technical requirements, like bleeds or trim marks, are missing, the printer will refuse to print them and ask for new files. This can be time-consuming and significantly delay a project.

Activity 3.1—Why Complying with Prepress Guidelines is Important (10 minutes)

Put participants in small groups. If possible, be sure to include at least one printing professional in each group to help support the discussion. If the participants are not as familiar with the technical aspects of prepping documents for printing, have the discussion focus on the potential consequences of the delay caused by not sending print-ready files. Ask groups to select one facilitator and one spokesperson. Give each group one stack of Post-it Notes and ask them to answer the question "*Why is complying with regulations important?*" with one word or a short phrase on each paper.

Give groups five minutes to complete the task. Collect and pin all the Post-it Notes on the board to initiate a discussion on the answers.

Facilitators may encourage participants to think of efficiency, costs, missed deadlines, books not available to students in time, etc. Encourage them to look at micro consequences as well as macro effects, such as the impact on children's learning. Participants can consider how delays will affect a ministry budget or how a book delay would affect their particular department and its goals for book printing.

Ready to Print File Checklist and Preflight

Procedure

Use Slides 29-34 to present the **Page Layout Guidelines** and **Ready to Print File Checklist** to the participants. Take care to define any terms that may be new to participants. Take any questions or comments from participants. Once all questions are answered, put participants in groups of five or six to do **Activity 3.2—Running and Reading a Preflight Report** (Slide 35)**.**

Content

Checking files is done to avoid complications in processing or during printing. The ***Ready to Print File Checklist*** includes number of pages, name of the data, page size, picture and text quality, and change of language in black.

Note the below as you use ***Handout 2: Ready to Print File Checklist.***

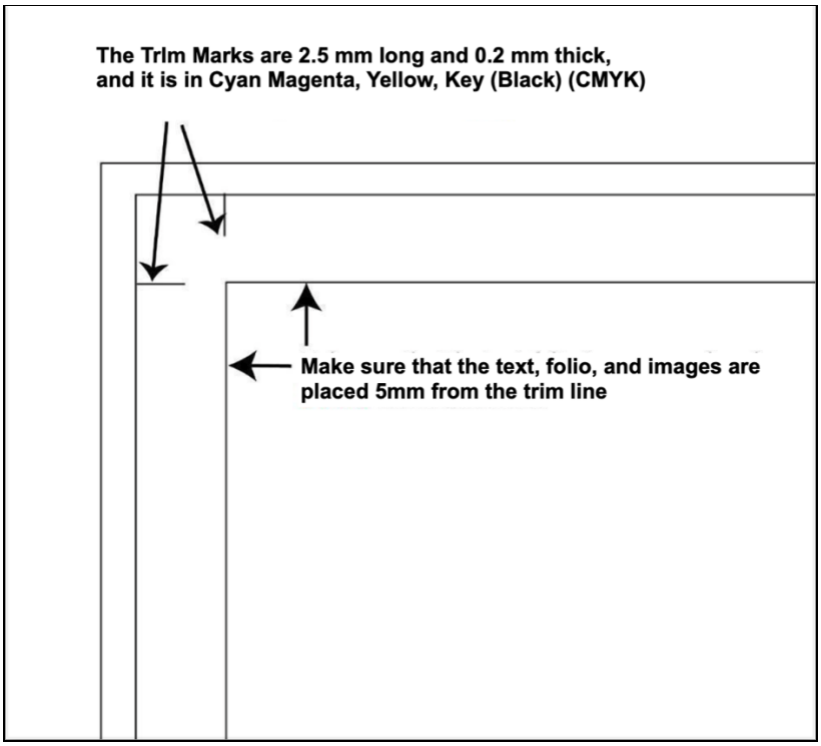
The List of the Accepted PDF Versions for Print-Ready Files

Print-ready files should be transferred as PDF/X-1a, PDF/X-3, or PDF/X-4, all of which have been generally adopted by the book chain industry as the most safe and secure method of file transfer. For data safety and to avoid file corruption, do not transfer files in open data formats such as Microsoft Word or InDesign.

Page Layout Guidelines

- It is recommended to use a desktop publishing and page layout designing software like InDesign, which is the publishing industry standard, widely used in combination with Photoshop and Illustrator. InDesign was created specifically for publishing, allowing ease in laying out books, including a master template to unify the multi-pages of a book.
- Pages should be created as a single page in finished page size, which is the final format of the book, and have bleeding of pictures and graphics extend by at least 5 mm around the page (head, foot, back, and margin).
- Trim marks need to be in place.
- Layout specifications for production with spine gluing should take into account the text and picture transition in the spine.
- Trim marks are lines printed in the corners of your print proof and printed signatures or covers to show the printer where to trim the paper for binding. Trim marks are used to allow for bleeds where an image or color on the page needs to extend all the way to the edge of the paper. Trim marks should be of 5 mm length, 0.2 mm thickness in cyan, magenta, yellow, and key (CMYK) (100 percent), and 2.5 mm away from the trimmed size

(net format). Make sure that elements like text, page numbers, etc. are not placed closer than 5 mm to the trim lines. Example below:



Accepted Process Color and Resolution

- For printing, illustrations or images are converted into the CMYK format as those are inks most commonly used in a printer. CMYK represents the four colors of cyan, magenta, yellow, and black. This means that a color such as orange is converted into a combination of percentages of CMYK. Orange may have a high percentage of yellow and a low or 0 percent of black. White would be shown as a 0 percent of all four colors. Colors should be created as CMYK process colors and the maximum application (trapping) may not exceed 280 percent, this means that the superposition of the percentage of the four colors should not exceed 280 percent. Black text must be created 100 percent solid black.
- A printed deep black color field must be shaded with 40 percent cyan.
- The color tone value range indicates the visual weight of a tint and should be between 2 and 98 percent.
- Pictures should have at least a 300 dots per inch (dpi) resolution.
- Graphics (e.g., logos or charts) not created in the vector format but in raster format (an assembly of pixels: JPG, PNG, GIF, etc.) should have a resolution of at least 600dpi.
- All fonts must be embedded.
- The minimum printable line or text, positive or negative, is 0.25 mm non-rasterized. Rasterized is the vector conversion in pixels.

Preflight of InDesign or PDF files

Preflight is the system used to check if files are ready for printing. Preflight tools are available in software such as Adobe InDesign, Adobe Acrobat Pro, QuarkXPress and others as well as some online preflight services. These tools can inspect and, in certain cases, correct the file and report on any possible printing errors. Doing a preflight check is very important to confirm that materials

are ready for printing, thereby avoiding costly errors and ensuring that production proceeds smoothly.

If the pdf files sent by a client to the printer do not fulfill the preflight requirements, the printer will ask his customer to resend ready-to-print files that do. (In some cases, the printer can fix the pdf itself, although this risks cost overruns and schedule delays.)

Some of the most common issues that are found during a preflight process include:

- Document size that is inconsistent with the design template
- Insufficient image resolution
- Fonts not outlined (this is a bigger issue than it may seem and can result in unexpected print results)
- Incorrectly specified colors, most commonly not set up in CMYK format
- Artwork not 'flattened', meaning printed output may not be consistent with what you see on-screen

Activity 3.2—Running and Reading a Preflight Report (15 minutes)

Run print-ready files through the preflight tool and display the report using the projector. Discuss the report with the participants and ask them what corrections are required before sending the files to the printer. A sample preflight report is included in the Appendix- ***Handout 3: Sample Preflight Report***, if the Preflight software is not available.

Below is guidance for reviewing ***Handout 3*** in the Appendix:

Report interpretation:

A. Items marked with a red **X** must be addressed:
   1124 objects found in the book in red, green blue instead of CMYK
   50 images found with a resolution below 150 pixels per inch (ppi)

B. Items marked with a warning should be addressed for a better result:
   One page has been found empty (white page)
   183 objects found less than 1.5 mm away from the trim lines
   57 objects found with a resolution between 150 and 225 ppi
   (recommended is above 300ppi)

Session 4: Printing and the Factors Influencing Book Manufacturing

Rationale

Print and paper technical specifications provided in a tender or Request for Quotation (RFQ) significantly impact the cost of a book. Understanding how those specifications influence the production process helps participants make the best use of these specifications and improve the communication and working relationship between clients and printers. The videos and samples provided in the session will help participants better understand the technical terminology used in the industry.

✓ *Objectives*

Upon completion of the activities of this session, participants will be able to:

- Explain the basic technical specifications of printing
- Describe how to plan print lead time and avoid unwanted costs

Duration: 45 minutes

Time Breakdown

Paper Grade and Prices	5 minutes
Activity 4.1—Identify Paper Grades	15 minutes
Paper Technical Specifications and Guidelines–Sheetfed	5 minutes
Activity 4.2—How to Fold a Printed Sheet into a Signature	10 minutes
Paper Technical Specifications and Guidelines–Web Offset	10 minutes
Total:	45 minutes

	Materials— 1. White samples of different paper grades 2. Printed sheets

Paper Grades and Prices

Procedure

Use Slide 36-38 to present the paper grades and prices chart. Take care to define any terms that may be new to participants. Take any questions or comments from participants. Once all questions are answered, do **Activity 4.1—Identify Paper Grades** (Slide 39).

Content

The grades of paper are defined in terms of its use. Each grade serves a purpose. Common classifications of printing papers are bond, coated, text, cover, book, and offset, among others.

Bond paper is appropriate for learning materials as it allows for writing in books. Coated is more expensive and often used for magazines. Covers need to be heavier for protection and durability.

Paper prices fluctuate on the world market since this is a commodity that is influenced by demand. Wood-free coated (WFC) paper is the most expensive paper and mechanical uncoated is the most affordable. The heavier the paper, the more the paper costs. Planning ahead to buy in bulk or well in advance of printing will reduce the costs and allow for the purchase of higher quality paper.

Certified environmentally friendly paper should be considered for printing projects. The immediate cost of environmentally friendly paper is more than new paper due to additional processes needed to produce the recycled paper. However, the long-term benefits of using less water, chemicals, and energy, as well as preventing the cutting of new trees, will lessen the impact on the environment if afforded. A variety of types of environmentally friendly paper can be found for different printing projects.

Activity 4.1—Identify Paper Grades (15 minutes)

Ask participants to circulate the five numbered paper samples. Ask them to note the differences between the paper grades. When each participant has inspected the five samples, ask the participants their answer for each sample; discuss how they determined their answer and comment.

After sampling the paper grades, discuss the following questions:

- *What factors influence a MoE's decision to invest in one type of paper vs. another?*
- *How does the purpose of the book affect the choice of paper? (Will it be written in? Will it belong to one child or many children?)*

Ask participants to consider the following scenario:
A Ministry of Education (MoE) has been given an amount of money to purchase books for schools. The amount cannot be increased. The MoE has enough money to buy a class set of books with one book per five children using the heavy bond paper which increases the durability of the books. The books may last for three years in its intended use. Or, the money could purchase one book for every one child using lighter, less expensive paper. The paper is more prone to tearing and would last only one year requiring a replacement next year.

- *Which option should the MoE choose?*
- *Could there be an alternative option?*

Paper Technical Specifications and Guidelines

Procedure

Use Slides 40-41 to present how paper is technically specified. Take care to define any terms that may be new to participants. Take any questions from participants and once questions are answered, do **Activity 4.2—How to Fold a Printed Sheet into a Signature** (Slide 42)**.**

Content

Below are technical specifications and guidelines for paper:

- Textbooks can be printed on mechanical coated paper with minimum brightness and opacity of 92%, to ensure the sharpness of images and text. This type of paper is cheaper than wood-free uncoated paper and 30% thinner, so the textbook takes less space in a classroom or schoolbag.
- Storybooks should also be printed on coated paper to enhance image and text sharpness.
- A workbook has a limited lifespan, so wood-free uncoated (WFU) is recommended. The rough surface of WFU paper also makes it easier for a child to write on. Any mechanical uncoated or recycled paper with an 85% brightness minimum would also be acceptable to save costs.
- For covers, card coated, single-sided is recommended for a perfect bound book and C2S (coated two sides) for a saddle-stitched one.

Sheetfed Printing and Folding

- When printing on a sheetfed printer, large sheets of paper are fed into the printer, manually or continuously. Because the book trim size matches the paper size, additional trimming is not needed, as it is for web offset printing.
- The size of the machine defines the number of pages per sheet. Pages are subsequently folded into signatures for finishing.
- The average net output of a sheetfed press is 8,000 sheets per hour for single-side printing, which means 4,000 sheets per hour for double-sided printing. Planning for sheetfed printing, such as maximizing the number of pages that work with sheetfed printing, can avoid the waste of blank pages.

Activity 4.2—How to Fold a Printed Sheet into a Signature (10 minutes)

Put participants in small groups. Give each group a printed sheet and ask them to fold it into a signature, allowing five minutes to complete the task, followed by one minute to present their work. Once all groups have presented, comment on the results. Discuss the number of pages of the books they folded.

- *Would it be easy to have a book of 9 pages? Why does a book of 8 pages work well?*
- *How does this understanding affect the page number specification of printing a book?*

Show the group a book with extra white pages at the back of the book. Lead participants in a discussion on how those blank pages could affect the cost and overall budget of a printing procurement.

- *Consider if 10,000 books are printed, how many blank pages would need to be covered in the budget?*
- *What decisions could be made to reduce the number of blank pages in a book to maximize the use of every page?*

☞ ☜	***Trainer's Notes***— The correct answers for the above activities are: ● The total number of blank pages would be the number of blank pages in the sample X 10,000. For example, if there are two blank pages then there would be 20,000 blank pages to be covered in the budget. ● Ensure that the total number of pages is divisible by four. There are a number of things that could be done to reduce the number of pages so that it is divisible by four, such as reducing the image size or number of images, reducing the font size (ensuring that the font size is appropriate for the age group), etc.

Web Offset Printing

Procedure

Use Slides 43-44 to explain offset printing. Take care to define any terms that may be new to participants. Take any comments and questions from participants.

Content

- Web Offset Printing is the best choice when large quantities of a book are required. Once set up, it runs quickly and efficiently, which allows for a lower unit cost of producing the book. Using web offset can reduce the time and cost of a large print run if the book can be a standard size.
- Web offset machines are equipped with an integrated folder that delivers ready-to-use signatures.
- The disadvantage of the web offset machine is that it has a fixed cut-off with a standard length and width, leaving no variance (e.g., the standard cut-off for A4 size is 630mm).
- Web offset presses are designed for print runs of over 15,000 copies due to the high startup waste requirements. These include the costs of printing and cleaning solvents, as well as the safe removal of these agents.
- The average net output of a web press is 20,000 copies per hour for a 16-page signature; 32-, 48- and 64-page presses are also available, but only in Europe and South Africa, though the market for the large machines is changing.

Printing Guidelines

- Always apply the 4-page split rule, which means that the total number of inside pages should be divisible by four.

- Procurers of book printing services should adapt the size of their book to the cutoff available in the market to avoid unnecessary wastage.
- Heatset offset printing is recommended when print quality expectation is very high.

Type of printing	**Price benchmark**
Sheetfed printing	US$6 - 8 per 1,000 sheets (single-sided)
	US$12 - 16 per 1,000 sheets (double-sided)
Heatset printing	US$8 - 12 per 1,000 signatures
Coldset printing	US$4 - 7 per 1,000 signatures

Session 5: Binding Options

Rationale

Just like print and paper technical specifications, binding specifications can significantly impact the cost of a book. Understanding how those specifications influence the production process helps participants choose the most appropriate option; this can also improve the working relationship between clients and printers.

✓ *Objectives*

Upon completion of the activities of this session, participants will be able to:

- Explain the basic technicalities of binding
- Describe how to plan binding lead time and avoid unwanted costs

Duration: 35 minutes

Time Breakdown

Options for Binding	15 minutes
Activity 5.1—Demonstrate the Binding Processes Using Samples	20 minutes
Total:	35 minutes

	Materials— 1. Signature and covered samples 2. Video on the different types of stitching 3. Examples of saddle stitching, perfect binding, and spiral or wire-o 4. Different types of spiral binding (wire-o, comb, coil) 5. Cardboard boxes for packing – highlighting carbon footprint and secure shipping characteristics

Options for Binding

Procedure

Use Slides 45-50 to present the content below. Take care to introduce any new terminology. Take any questions from participants, and once all questions are answered, do **Activity 5.1—Demonstrate the Binding Processes Using Samples** (Slide 51)**.**

Content

There are three types of machines for binding:

- **Saddle stitcher** or **wire stitcher:** for books less than 96 pages and less than 6-12 months of use.
- **Perfect binding:** can produce between 2,000 and 10,000 copies per hour, and the lifespan is long.

- **Spiral or Wire-o binding**: used when the book needs to be displayed, in a classroom, for example.

Saddle or Wire Stitching

- Saddle or wire stitching is the cheapest and fastest way to bind a book but is limited to 96 inside pages.
- The expected lifespan of a saddle-stitched book is between 6 to 12 months.
- Saddle stitching machines can produce 5,000 to 15,000 net copies per hour at a very low wastage rate. High-speed machines producing 10,000 to 15,000 copies per hour are only available in Europe.

Perfect Binding

Perfect binding uses an adhesive applied to the spine of gathered single sheets resulting from a signature where the edge has been cut off. When the adhesive dries, the pages stay together forming a rectangular-shaped spine. This binding is used with a soft or paperback type cover. Thick magazines or catalogues are also common examples of the use of perfect binding. Page counts of up to 400 pages can be used with perfect binding, but more caution is needed as the page count increases because the technical difficulty also increases. Perfect binding is quite durable and known for longevity. The paper covers are more likely to wear before the binding. Perfect binding costs range from US$25 to US$60 per thousand copies, depending on the spine thickness of the book and the number of signatures.

Below are some specific technical tips when using perfect binding:

- Perfect binding can have a spine of 2-600 mm and a maximum weight of 100 grams.
- Softcover perfect binding includes three processes: Gathering, Binding and Cutting.

  Two types of glue are used, Polyurethane Reactive (PUR) and Hotmelt (also called EVA or Ethylene-vinyl acetate).
- Hotmelt is an adhesive generally made from thermoplastic polymers; the glue melts at >70 degrees Celsius (>158 degrees Fahrenheit).
- PUR is a moisture-cured glue and is the most durable book binding glue available. It is far superior to EVA, or Hotmelt, or any other adhesives used in traditional perfect binding. While PUR costs more than EVA by weight, it is also less dense, so less adhesive is needed, reducing the price gap and making it as economical as EVA.
- PUR has superior flexibility, which prevents the spine from cracking when the book is opened wide or pressed down flat. International standards require a bound book to achieve a flex test of 500 (see definitions below). PUR can achieve 1,000, the same as section sewing.
- PUR offers 40–to 60 percent better resistance to page pull-out than EVA, which is comparable to section sewing. In fact, it is nearly impossible to pull a page out of a book bound with PUR adhesive. The paper tears before the binding.
- PUR can adhere to a wide variety of substrates, including ink, varnish, recycled paper, mylar, and UV-coated stock.
- PUR's performance and structural integrity are not affected by extreme cold or hot environments 4° to 93° Celsius (-40° to 200° Fahrenheit).
- Because PUR is so strong and pliable, less adhesive is needed to firmly bind the cover and pages. Less glue means less distortion of the spine's shape, resulting in a crisp, square appearance, even on thinner books.

- Perfect binding machines can produce between 2,000 and 10,000 copies per hour.

There are two methods to check the strength of the binding:

- **The pull test** measures the strength of the page binding perpendicular to the spine. A testing machine (typically a Moffett unit) literally pulls a page out of the binding using a hydraulic system. The amount of force required is measured on a gauge; the minimum standard for this test is 30 lbs.[4]
- **The flex test** involves another testing machine that "flexes" the page back and forth at 50 cycles per minute, with two pounds of force pulling on the page. A baseline standard for this test is 500 flexes without failure. Some printers set much higher standards.[5]

Spiral or Wire-o

This method uses comb, wire-o, and coil-binding pages held together by wire or plastic coil that runs through a series of holes punched along one side of a book. This binding methos is used when the book needs to be displayed, such as in a classroom or library.

Section Sewing

- Sections or signatures are sewn together before adhering the text pages to a soft cover with hot glue (perfect binding). It increases the strength and the durability of the book but also allows a flat opening. Section sewing binding is very durable and will outlast the life of the pages. Due to the specialized nature and equipment needed for section sewing, the cost of section sewing binding is the most expensive option, at least twice as much as other binding methods. Any size book could be bound using section sewing.
- The process is slow and costly because the signature needs first to be gathered (e.g., 600 copies per hour for a 160-page book).
- For large print runs, multiple machines are required, but most printers only have two or three. In lower and middle-income countries (LMIC), printers may have one machine or none at all.
- Section sewn blocks can only be perfect bound with Hotmelt glue. The PUR glue layer is too thin to properly glue the cover to the block.
- Section sewing is most often used in combination with saddle stitch or perfect binding.

☞ ☜	***Trainer's Notes***—Note for participants that information determining technical specifications, including choosing specification for binding in a Request for Quotation (RFQ) or tender, is covered in the **Procurement and Purchasing Module.** Encourage participants to look at that module to learn more.

[4] Piontek, D. 2017. Judging a Book by Its Binding: Standards for Quality Needed at Digital Shops. *Printing Impressions*, 13 Jan. 2017, www.piworld.com/post/judging-book-its-binding-standards-quality-needed-digital-shops Donpiontek/all/#:~:text=The%20second%20widely%20used%20test,printers%20set%20much%20higher%20standards.

[5] Ibid.

Activity 5.1 – Demonstrate the Binding Processes Using Samples

(20 minutes)

Put participants into three groups. Give the first group samples for saddle stitching, the second group samples for perfect binding, and the last one the samples for wire-o.

Give groups five minutes to prepare the demonstration of the production process with the samples, followed by two minutes to present their work. The presentations should discuss the strengths and weaknesses of the process they tested.

Once all groups have presented, ask them to comment on the results. Participants could try another process during a break or after the training.

Session 6: General Information on the International Book Supply Chain Market

Rationale

The location of manufacturing can be key for an efficient book project, especially regarding price, quality, and timelines. This session provides an overview of the international printing market and the background needed to compare printing done locally versus internationally and understand how to consider the best location of operation. The two activities in this session allow participants to exchange views on local versus regional/international production.

✓ *Objectives*

Upon completion of the activities of this session, participants will be able to:

- Describe the key differences between an international or local book procurement

Duration: 50 minutes

Time Breakdown

Book Printing Market	5 minutes
Activity 6.1 – Brainstorm on Challenges in the Book Printing Market	10 minutes
Factors Influencing the Location of Operations	10 minutes
Activity 6.2 – Case Study on the Factors Influencing the Manufacturing Location	25 minutes
Total:	50 minutes

	Materials— 1. World map of book printing – to include high-volume exporters, countries with self-sufficient capacities, countries lacking production capacity, found in the PPT 2. Handout 4: Case Studies 3. Flip charts and markers

Preparation

Print **Handout 4: Case Studies** for each participant.

Book Printing Market

Procedure

Using Slides 52-56, present the maps and the material below. Take care to define any terms that may be new to participants. After presenting the material, take any questions or comments from

participants. Once all questions are answered, do **Activity 6.1—Brainstorm on Challenges in the Book Printing Market** (Slide 57).

Content

World Map of the Book Printing Market

To better understand the book printing market, compare the three maps showing the countries most involved in the international BSC market regarding the following aspects:

- High-volume exporters
- Countries with self-sufficient capacities
- Countries with limited production capacity

Consider what the maps say about who is supplying printing and who is buying the printing. Are they the same countries as those who are self-sufficient in printing capacity? Consider the distance between the high-volume exporters and the countries that lack production capacity. Would it be likely that the printing be transported by air or by sea or by land? Manufacturing lead times need to be considered in relation to location as many LMICs will need additional time to import quality paper as their country is not self-sufficient.

Activity 6.1 – Brainstorm on Challenges in the Book Printing Market

(10 minutes)

Share the world maps of book printing found on Slides 44-46. Brainstorm with the participants on some of the reasons LMICs with sufficient production capacities may be unable to produce enough books to export. The areas of discussion include customs duties, resources, and inventory available in-country including paper and ink, road and port infrastructure, fluctuating currency, geopolitical issues, etc.

Factors Influencing the Location of Operations

Procedure

Use Slides 58-63 to explain the factors influencing the advantages or disadvantages of locations. Take care to define any terms that may be new to participants. Take any questions or comments from participants. Once all questions are answered, do **Activity 6.2—A Case Study on the Factors Influencing the Manufacturing Location** (Slide 64)**.**

Content

Selecting the best location for printing is influenced by a number of factors including the following:

Paper Procurement Lead Time

It is essential to know if the potential printers have the required paper in stock or if it will have to be procured; will it be sourced locally, regionally or from overseas? If the printing takes place in India, China, Korea, or South Africa, paper can be sourced within 15 days on average; two to three months in Africa, two months across the rest of Asia; and three weeks in Europe.

Shipping and Transportation Time

Three out of 67 shipping lines control 60 percent of the deep-sea market. They are Maersk, MSC and CMA-CGM, and their shipping schedules can be consulted on their website. Importing also requires one to two weeks to clear customs formalities. Travel between ports in-country must also be calculated in the total transportation time.

Production Capacity

Printing professionals should assess the production capacity declared by the printer because very often they submit machine maximum speed instead of the net average output per hour, which is generally 30–50 percent slower. By requesting the type and model of the machine used for printing, the specifications can be found from the manufacturer.

Price Expectation

Price is influenced by import duties, taxes, and fees on raw materials, payment terms proposed by the procurer, working capital financing interest, exemptions and subsidies, foreign exchange fluctuation, domestic preference, and technical specifications that impact machine wastage. When preparing technical specifications, one should be mindful of the layout, such as remembering that pages must be divisible by four or using large margins will be a less efficient use of paper and cost more.

Quality

Print quality varies significantly in regions across the globe and is dependent on the following conditions in print production: availability of new equipment and ability to maintain it, the level of industry development, the level of capacity building within the industry (training, technical support, and quality control), as well as the level of paper quality produced or its accessibility within a particular region.

Political or Policy Goals

There can be significant benefits in utilizing domestic printing companies, such as supporting the development of the local printing industry. Sourcing print materials from international suppliers adds potential risk due to challenges in the international supply chain or issues related to customs and taxation. However, if a country does not have the capacity to print materials in the quantity and quality required, then reliance on international sources is necessary.

If using domestic printers, it can be very useful for the MoE, donors, and non-governmental organizations (NGO) procuring printing services to create a local network to identify, recommend, and support local capacity of printing services and resources. Creating this local group will allow for an exchange of recommendations and best practices for printing within the country.

Environmental Considerations

Paper certified as environmentally friendly, as well as waterproofed carton boxes, can be requested to reduce the impact of the book project on the environment. Also, consideration needs to be made on the location of the printing house in relation to highly populated areas, whether urban or rural. The processes involve toxic chemicals and other hazardous materials, and

the usage and disposal of them should be under tight quality control, away from populated areas and water sources. The carbon footprint in relation to the location of the printer and the place of delivery also needs to be considered.

Local Printer vs. International Printing

The choice of international versus local printing is complex. Printing locally has the advantage of supporting local industry, and in the future, could lead to reduced prices (Increasing local competition could result in pricing drops). For now, it is generally less expensive to print internationally, which tends to make books more cost-effective.

When printing locally, economies of scale can be created by breaking the tender into smaller lots, which can be more accessible to smaller printers. Such economies exist when printers have government support and the same tax incentives as book importers.

Corruption

When transactions are transparent and carried out in openly competitive printing markets, there is less chance of corruption.

Timeline Consideration Examples

Timelines vary by country depending on local printer capacity, whether the country is landlocked or not, and how far the paper producers are from where the books are required. For illustrative purposes, the table below provides an example of the time required to produce 250,000 copies of a textbook locally vs internationally in Malawi and Senegal. In addition, the BSC has been heavily affected by the supply chain crisis that emerged in mid-2021 and it is not clear when the timelines will return to normal.

Timeline Consideration Examples-Local vs. International (more than 250,000 textbooks)								
	Malawi				Senegal			
	Locally produced		Imported books from India		Locally produced		Imported books from Europe	
	Standard timelines	Current supply chain crisis timelines	Standard timelines	Current supply chain crisis timelines	Standard timelines	Current supply chain crisis timelines	Standard timelines	Current supply chain crisis timelines
Paper procurement	15 weeks	24 weeks	3 weeks	5 weeks	12 weeks	20 weeks	3 weeks	15 weeks
Printing	4 weeks +		2 weeks +		4 weeks +		1 week +	
Binding	2 weeks +		1 week +		4 weeks +		Included in printing	
Packing	Taking place while binding				Taking place while binding			
Shipping			5 weeks	7 weeks +			3 weeks	5 weeks +
Delivery to schools	4 weeks +				4 weeks +			
Total	**25 weeks +**	**34 weeks +**	**15 weeks +**	**19 weeks +**	**24 weeks +**	**32 weeks +**	**11 weeks +**	**25 weeks**

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[6] Illustrative examples provided by the author.

Activity 6.2—Case Study on the Factors Influencing the Manufacturing Location (25 minutes)

Put participants into small groups. Ask them to select one facilitator and one notetaker/spokesperson. Give each group the case study found in the Appendix **(Handout 4: Case Study** and ask them to discuss the context and technical specifications to prepare a reasoned choice printing locally or internationally.

Give groups 10 minutes to complete the task, followed by two minutes to present their answers. Once all groups have presented, discuss the case study using the following prompts:

- *What choices were made in choosing a printer? Why did they choose the printer to be local or international?*
- *What were the advantages or disadvantages in making that choice?*
- *What lesson can you take away from the case study?*

Share the following once discussion is complete, if these points have not been covered:

Considering the 30-day delivery timeline, it is practically impossible to print outside Malawi due to the time it would take to ship books from overseas. To reduce the book cost, the timeline would need to be increased by at least 30 days to accommodate shipping, transportation and custom clearance by an international printer.

For this procurement, since the books were needed urgently, the NGO decided to get the books printed locally and agreed to pay a premium of 60 percent in comparison with international prices. The books were ready on time for delivery to school, but the NGO had to increase their budget and pay more in order to ensure delivery on time. Overall, planning ahead and providing sufficient time for printing and delivery can decrease costs.

Session 7: Wrap up and Reflections on the Workshop

Rationale

Through the preceding sessions, participants have learned the role of printing in the BSC from preparing files for printing, the types of printing machines, the options for binding books, and general information on the book supply market. In this session, participants will reflect on their learning, review their expectations, and provide their evaluation of the training.

Objectives

Upon completion of the activities of this session, participants will be able to:

- Articulate how they will use what they have learned in the training in their work
- Provide feedback on the module

Duration: 35 minutes

Time Breakdown

Activity 7.1—Taking Action and Expectations Review	20 minutes
Evaluation	15 minutes
Total:	35 minutes

	Materials— 1. Flip charts and markers 2. Handout 5: Evaluation Questionnaire

Preparation

Display expectations on the walls of the training room or via PowerPoint.

Review **Handout 5: Evaluation Questionnaire** and make enough copies for all participants.

Procedure

Share Slide 65. Complete the module by conducting **Activity 7.1—Taking Action and Expectations Review** (Slide 66)**.** Once completed, hand out the Evaluation Questionnaire and ask participants to complete it and hand it in before leaving the training. Explain that the evaluation is anonymous and will be very helpful in improving the course for the future, so their candid feedback is welcome. Identify a basket or envelope at the front of the room where participants can place their evaluations when finished. Thank the participants for their participation.

Activity 7.1 – Taking Action and Expectations Review (20 minutes)

Keeping the same grouping of participants, ask participants to first reflect individually on the following questions: *What actions would you like to take to improve the BSC in their individual contexts? What is one thing you will take and apply from this training in the area of printing which would help to ensure high-quality books are in the hands of more children?* Then ask them to share their action steps with others at their table. Finally ask each table group to share one or two actions discussed.

Then, using the flip charts where you recorded participant expectations at the start of the training, ask participants to reflect on to what extent they feel their expectations have been met through the training. Answer any remaining questions that may arise.

Appendices

Session 2

Handout 1: Printing Options

Number of Copies (approximate)	1-1,000	1,000-15,000	15,000+		100,000+
Type of printing	**Digital**	**Sheet fed**	**Heatset web offset**	**Coldset**	**Publication gravure**
Production method	Use plate-less, toner-based printing devices. Digital information printed via ink cartridges directly onto paper.	Ready-made sheets go directly into the press.	Intermediate rubber blanket is used to transfer printing ink to paper surface. The inked printing plate transfers ink to the blanket, which then applies ink to paper.	Intermediate rubber blanket is used to transfer printing ink to paper surface. The inked printing plate transfers ink to the blanket, which then applies ink to the paper.	Use copper cylinders to print on paper. The images are engraved or etched into the cylinders creating recesses for the ink. Then the paper is pressed to transfer the image.
Characteristics	- Limited paper options - Higher per unit cost	- Coated and uncoated stock - 28 gsm to 350 gsm - Ideal for covers	- Headset utilizes drying lamps or heaters to cure or “set” the inks - Coated, uncoated, mechanical, or newsprint - 40 to 200 gsm	- Ink dries through absorption into paper - Ink can smudge so mostly for newspapers - Only uncoated paper	- Cylinders last a long time and require less maintenance making it suitable for high volumes - Good quality on lower quality paper, coated or uncoated -32 to 115 gsm
Print Times	Variable	On average 8,000 sheets, one side printed per hour	On average 25,000 signature per hour	On average 25,000 signature per hour	On average 35,000 signature per hour
Set Up Time	Set up time is a few minutes per signature	Set up time is one hour per run	Set up time is 2 hours per signature	Set up time is 1.5 hours per signature	Set up time is longer, 3 hours per signature

Number of Copies (approximate)	1-1,000	1,000-15,000	15,000+		100,000+
Indicative prices for a 200 x 270mm, per 16-page signature	Variable - from US$1 to $15 per book	US$ 0.015	US$ 0.008	US$ 0.004	US$ 0.006

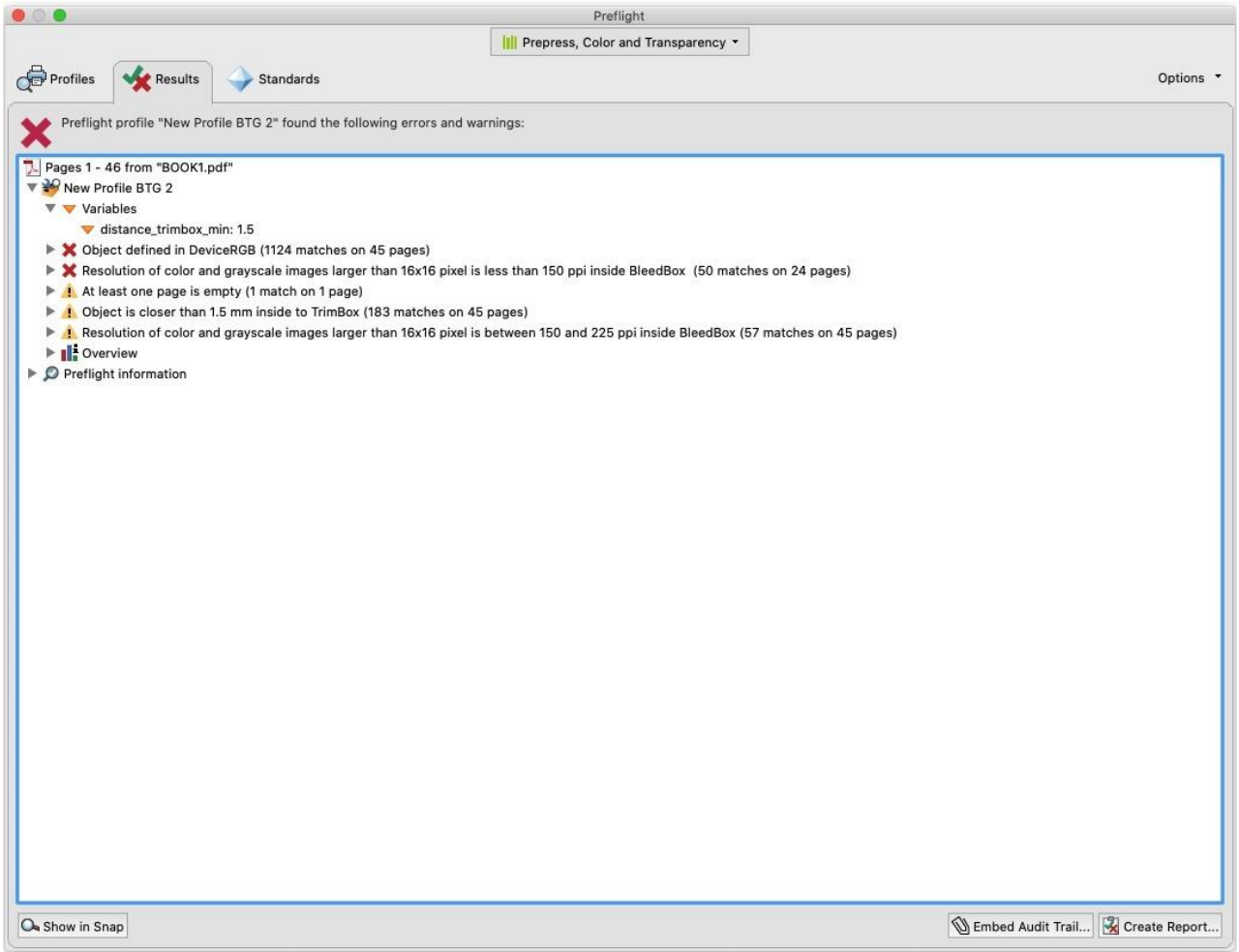
Session 3

Handout 2: Ready to Print File Checklist

Data specification	Check points	Yes	No	Comment
Number of pages	Correct number of pages			
	Check of folio or signature			
Name of the file	According to the naming convention			
Page size	Bleed box			
	Trim (or cutting) mark			
	Text, page numbers, picture placed no closer than 5 mm from the trim (or cutting) marks			
	Consideration of the binding			
Picture and text quality	File uses CYMK			
	Max. CMYK application does not exceed 280%			
	Black text in 100% black			
	Resolution of pictures 300dpi			
	All fonts embedded			
	Min. printable line or text is more than 0.25 mm			
Change of language in black	All changes between language versions only in black			

Session 3

Handout 3: Sample Preflight Report[7]



[7] Peachpit. 2011. Diving into Acrobat: Examine and Fix PDF Files with Acrobat Preflight. www.peachpit.com/articles/article.aspx?p=1756414&seqNum=3.

Session 6

Handout 4: Case Study

Use what you have learned throughout this module and the information below regarding technical considerations, quality, cost and timing to determine whether the printing could be best met locally or internationally in the case study presented.

Context:
A Malawian-based NGO wants to procure the books specified below and needs to distribute them thirty days after the award to the printer. The NGO has a budget of US$190,000 for printing the books, that cannot be increased without reducing the budget for other activities. Consider the following to decide whether an international or national printer should be considered.

Technical specifications:

Title	Qty	Size	Paper - cover	Paper - inside	# of Pages - Cover	# of Pages - Inside	Color – Cover	Color - inside	Cover finish	Binding	Packing/ Delivery
English Student Book G5	135,000	B5	240 gsm, G2s	80 gsm Coated paper min brightness and opacity 92%	4	48	4/0	1/1	Laminatio n	Saddle stitching	Packed in 5-ply corrugated carton as per distribution list/ distribution per school

Note: these specifications align to the recommended specifications for textbooks.

Production Capacity

- **Local printing:** At least four printers in Malawi are equipped with one sheetfed machine capable of producing 6,000 signatures of 16 pages B5 size per hour and one saddle stitching machine capable of binding 3,000 copies per hour.
  At 16 pages, a Sheetfed machine can accommodate four covers (16/4=4), and therefore 30,000 runs are needed to produce the covers (135,000/4=33,750).
- **International printing**: One international printer who responded to the Invitation to Bid has high production capacity, with several sheetfed machines as well as digital and web offset machines.

Quality

- **Local printing:** References were generally good, but there were some complaints of late delivery due to equipment malfunction.
- **International printing**: References were good.

Cost considerations

- **Local printing:** The lowest bid for a national printer was US$235,250.
- **International printing**: The international bid was US$184,000

Note: The cost for printing locally is 60 percent above the cost of printing internationally.

Timeline

- **Local printing:** The lowest bidding local printer is capable of delivering the books on time, but they will have to increase the number of working shifts or work every day of the week to avoid delays to ensure that 18 of the 30-day timeline are working days.
- **International printing:** The international printer needs five weeks to print and deliver books (more when supply chains have been slowed).

Discuss and prepare reasoned answers to these questions:

1. What are the pros and cons to selecting a local vs. international printer?
2. What are the possible adjustments or negotiations the project could consider (i.e., technical specifications, budget, donor, cost, timeline)?
3. Would you recommend printing locally or internationally? Why?

Conclusion

Considering the 30-day delivery timeline, it is practically impossible to print outside Malawi due to the time it would take to ship books from overseas. To reduce the book cost, the timeline would need to be increased by at least 30 days to accommodate shipping, transportation and custom clearance by an international printer.

For this procurement, since the books were needed urgently, the NGO decided to get the books printed locally and agreed to pay a premium of 60 percent in comparison with international prices. The books were ready on time for the delivery to school, but the NGO had to increase their budget and pay more in order to ensure delivery in time. Overall, planning ahead and providing sufficient time for printing and delivery can decrease costs.

Session 7

Handout 5: Evaluation Questionnaire

Thank you for participating in the Global Book Alliance's Printing training. Your comments and feedback on the training will help improve future sessions. Please take some time and answer the questions below as fully and honestly as you can. All of your responses will remain confidential. Thank you.

1. To what extent has your knowledge of printing increased? Please answer on a scale from 1 (my knowledge has not increased) to 4 (my knowledge has substantially increased).

   1: my knowledge has not increased
   2: my knowledge has increased just a little *(less than I would hope to get out of a training)*
   3: my knowledge has increased moderately (*as much as I would hope to get out of a training)*
   4: my knowledge has substantially increased *(more than I would expect to get out of a training)*

2. To what extent will you be able to use what you have learned? Please answer on a scale from 1 to 4.

   1: Not at all
   2: Rarely
   3: Sometimes
   4: Often

3. What parts of this module were most useful in helping you understand the role of printing in the book supply chain? What made it useful?

4. What parts of this module were least useful in helping you understand the role of printing in the book supply chain? What made it not useful?

5. How satisfied were you with the delivery of the training?

   1: Not at all satisfied
   2: Somewhat satisfied
   3: Extremely satisfied

6. What would you suggest to improve the format or delivery of the training?

7. Please provide any other comments: