

ADDIE: Designing Web-enabled Information Literacy Instructional Modules

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ABSTRACT

Proliferation of information in varying forms, formats, and amounts mystify users evaluating the quality and authenticity before consuming information. Unless the users are information literate, they will be deficient in the requisite skills to access and retrieve information, organise and evaluate critically the retrieved information and use it effectively for personal as well as professional accomplishments. Information literacy (IL) empowers one with the required knowledge about information, its nature and available formats, skills to fetch the relevant information by sifting the irrelevant information, and attitude for consuming and sharing information by ethical means and practices. This article focuses on how to impart IL instructions using the potential technologies. Among all the available options for imparting IL instructions, Web is preferred owing to its flexible nature to reach out to the target groups wherever they are and whenever they want to access the IL modules. A diligent effort is made to integrate ADDIE, the widely-used instructional design model for designing and developing IL modules. INFOSEEK, the five-faceted model presented under Design Phase provides a content framework for developing IL instructional programmes.

Keywords: ADDIE, INFOSEEK, information literacy, instructional design, learning content management systems, lifelong learning, pedagogy, web-enabled modules

1. INTRODUCTION

Proliferation of information in varying forms, formats, and amounts has made the contemporary era 'information intensive' with manifold choices to access and retrieve information. However, this requires the skills to exploit the best choice among the myriad. Furthermore, the current scenarios mystify users evaluating the quality and authenticity before they consume information. All these intricacies pose challenges to individuals in accessing and retrieving information efficiently, sifting and evaluating its authenticity, validity, and reliability for its effective use. Here arises the need for Information Literacy (IL), which nurtures critical thinking and discernment about the whole gamut of information and its varying formats, prior to its consumption.

This article not only signifies IL as the driving force for lifelong learning but also delves into how to design IL instructional modules using Analysis, Design, Development, Implementation and Evaluation (ADDIE), an instructional design model.

2. INFORMATION LITERACY

Information literacy, evolved from bibliographic instruction, library instruction, and user education transformed sources oriented approach into process-oriented approach. IL is an overarching concept that "focuses on information use rather than on bibliographic skills, that is, students must develop information competencies to become effective learners".¹

Information literacy is the competency that empowers one with the required "knowledge about information, its nature and available formats; skills to fetch the relevant information by sifting the irrelevant, and attitude for consuming and sharing information, by ethical means and practices".² In the context of IL, empowerment can be defined as "providing users with the skills necessary to find and exploit information that they need for work, study and leisure".³

Information literacy empowers one with task accomplishing skills in part by Fluency with Information

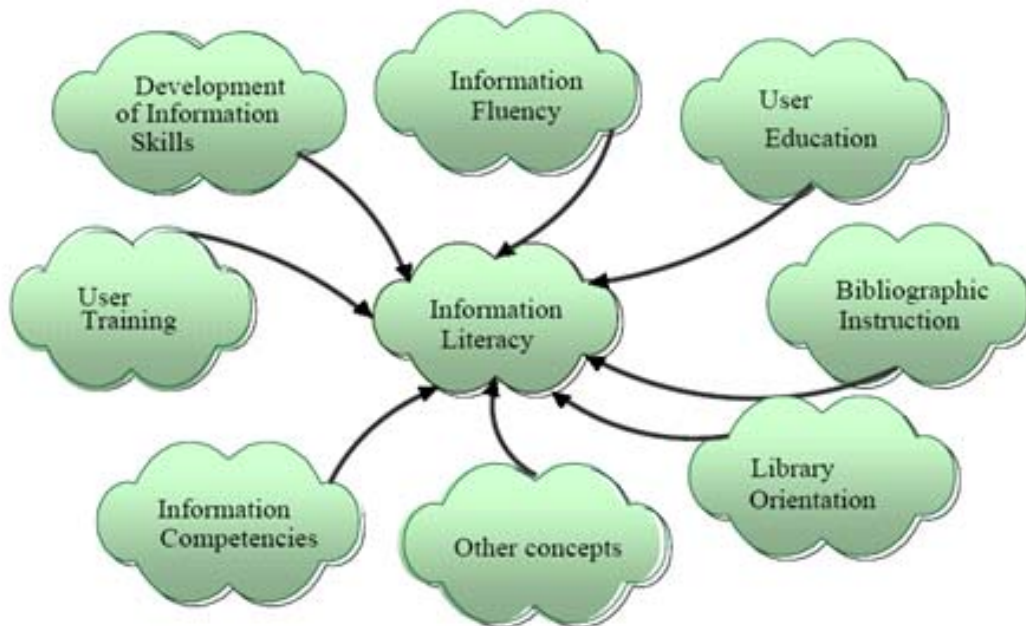


Figure 1. Concept of information literacy.

Technology (FIT), in part by sound investigative methods, but most important, through critical discernment and reasoning. IL initiates, sustains, and extends lifelong learning through abilities, which may use technologies but are ultimately independent of them.⁴ IL, a set of skills equips one with 'technology fluency' and 'information fluency'. Technology fluency or FIT enables one to harness technology and its various tools. Whereas, information fluency equips one with skills imperative for understanding, seeking, locating, retrieving, evaluating, consuming information efficiently and effectively to meet his or her information needs and generate new knowledge.

UNESCO⁵ publication, Principles of Awareness-Raising for Information Literacy: A Case Study, summarises the essential skills and values for effective IL as:

General Skills

- (a) Problem solving.
- (b) Collaboration and teamwork.
- (c) Communication.
- (d) Critical thinking.

Information Skills

- (a) Information seeking.
- (b) Information use.
- (c) Fluency with Information and Communication Technology (ICT).

Values and Beliefs

- (a) Using information wisely and ethically.
- (b) Social responsibility and community participation.

The ability to read is a basic skill, but the ability to get the right information is the survival skill in the information era. It is IL that equips one with the ability to find the best information among the myriad of sources and apply it to make wise decisions.

3. SIGNIFICANCE OF INFORMATION LITERACY

Information literacy is not only significant to individuals for various levels of education but even for various occupations, daily decision-making, and problem-solving, thus enabling lifelong learning process.

Increasing attention to IL is partly the result of information overload especially related to the growth of digital information, which has even caused a new ailment called Information Fatigue Syndrome (IFS)⁶, and partly because of the new focus on student learning in a lifelong learning context.⁷

Information literacy and lifelong learning are interrelated concepts. Both are "self-motivated and self-directed, and do not require the mediation of an outside individual, organisation or other kind of helper, beyond the learner him/herself, although advice and assistance can be helpful".⁸

The current information and technology intensive environment, with information exploding in multiple

directions in varying forms and formats, through multiple media, creates a chaos among learners. This bewilderment is due to the deficiency in information competency.

Unless the learners and/or users are information literate, they will be deficient in the thriving skills to access and retrieve information, organise and evaluate critically the retrieved information and use it effectively for personal as well as professional accomplishments. 'Information illiterate' will have fewer opportunities to cope with the current information age when compared to 'information literate'.

UNESCO's IFAP (Information for All Programme, 2006) accentuates, "Everybody should have the opportunity to acquire the IL skills in order to understand, participate actively and benefit fully from the emerging knowledge societies".⁸

Information literacy is a 'prerequisite' and 'essential enabler' for lifelong learning. Lifelong learning is 'all formal, non-formal, and informal learning whether intentional or unanticipated, which occurs at any time across the lifespan'.⁹ Having realised IL as the driving force for lifelong learning, LIS practitioners need to conceive plans on 'how to impart IL instructions', harnessing available technological tools for reaching out to innumerable number of audience.

4. WEB-ENABLED INFORMATION LITERACY PROGRAMMES

Technology infusion for imparting IL not only acclimatises the learners to the e-ambience but also facilitates 'flexible access' to IL modules. Flexible access refers to access and use of information and resources at a time, place and pace that is suitable and convenient to individual learners rather than the teacher and/or the educational organisation.¹⁰

Modes of IL instruction may range from stand-alone courses to online tutorials through formal class settings, one-on-one or small group sessions, written guides and brochures, audio-visual presentation, and self-learning packages (CD/DVD). Among all the available options for imparting IL instructions, web-enabled tutorials are gaining momentum owing to their inherent nature of flexibility in reaching out to the target groups wherever they are, and whenever they want to access the IL modules. Moreover, ICT offers multiple tools and formats to users, to access, retrieve, manipulate, analyse and repackage information in a customised form to meet their needs for effective use and scholarly communication.

Web-enabled IL programmes enable students to access it anytime and anywhere, provided they have Internet access. Tess Tobin and Kesselman¹¹ summarises the advantages of web-based instructions as:

- ✘ Web-based instruction allows self-directed, self-paced instruction in any topic.
- ✘ Web-based Training (WBT) is media-rich training fully capable of evaluation, adaptation, and remediation that can provide the available tools to organise and deliver content into well-crafted teaching systems.

However, before embarking on technology-integrated education and information services, feasibility study is mandatory. For making wise decision in this regard, Bates¹² presented a decision-making model ACTIONS that stands for Access, Costs, Teaching functions, Interactivity, Organisational Issues, Novelty, and Speed.¹² Analysis of these factors helps us choose the appropriate media and technologies and their suitable teaching functions for developing and delivering the IL learning resources. Knowledge and understanding of learning theories and the pedagogical skills are indispensable for LIS professionals to design, develop, and deliver (Web-enabled) IL modules. For rendering web-enabled IL instructional services, library and information practitioners need to reengineer their 'instructional strategies' and adopt e-pedagogy to break down the barriers, and the time and space put forth for imparting library instruction programmes.

5. INSTRUCTIONAL DESIGN AND INFORMATION LITERACY

Instructional Design (ID), a systemic process involves needs analysis and the development of an effective delivery system to meet those needs. In addition to the development of instructional materials and activities, ID involves developing reflective learning activities and evaluation practices to engage learners so as to make their learning process active and constructive.

Instructional Systems Design involves designing and development of instructional specifications using appropriate learning and/or instructional theories, to facilitate effective learning. Adopting suitable learning theory based on student-learning-style, enables information professionals "to explore the possible link between the way in which students experience IL and their level of engagement (surface or deep) with other assignments".¹³

Information literacy rejects the traditional teacher-centred learning model, rather, IL is based on active learning model in which the student is at the centre of the learning environment.¹⁴

Information literacy programmes should provide learners with self-directed, independent and constructive learning opportunities. Constructivism as learner-centred approach enables learner to build his or her own knowledge through engaging learner in active investigation and thought. The Alexandria Proclamation

on Information Literacy and Lifelong Learning recommends: "Implement active pedagogical practices such as problem-based learning, service learning and constructive learning that are both in support of and well supported by the practice of IL".¹⁵

Constructivist approach is preferred to impart IL instructions as: (i) learning can be achieved by reflective thinking to solve problems, wherein teachers act as guides; (ii) learning is an active process of discovery and categorisation, wherein learners build on their prior knowledge and experiences to reach advanced level of understanding.¹⁶

Constructivist learning enables the learner co-construct meaning by exploring an environment, solving a problem, or applying information to a new situation that he/she helps to define. While designing and developing IL instructional modules, LIS professionals need to embed the pedagogical and andragogical techniques and practices, which promote constructive learning among the participants. Instructional Technologies Committee, ACRL Instructional Section suggests the following tips on the pedagogy of Web instruction:¹⁷

- (i) Outline the objectives and outcomes clearly to establish purpose and realistic expectations.
 - (a) Outcomes address the larger overall goal(s) of student learning.
 - (b) Objectives address actions or learning behaviours that will result from the instruction.
 - (c) Keeping this tip in mind helps to avoid the use of technology for technology's sake.
- (ii) Provide a clear, intuitive structure that:
 - (a) Reflects the objectives of the instruction.
 - (b) Allows for different learning styles.
 - (c) Permits the student to self-pace and remediate.
- (iii) Include active learning techniques to foster student-computer, student-student and/or student-instructor interaction. Some techniques to consider incorporating include:
 - (a) Promoting user-created content.
 - (b) Developing tools to aid in student self-assessment and feedback.
 - (c) Providing occasion for discussion.
 - (d) Creating collaborative opportunities to enhance comprehension of concepts being taught.
- (iv) Give attention to IL concepts rather than the mechanics of a particular technology so that
 - (a) Skills learned will be more transferable to future use.

- (v) Incorporate contemporary language and topics, be as succinct as possible, and don't be afraid to entertain. This strategy will:
 - (a) Establish relevance to students' lives.
 - (b) Not overwhelm them with verbiage.
 - (c) Help to keep their interest.
- (vi) Provide multiple ways to students to communicate with the instructor and subject experts such as librarians.
- (vii) Whenever possible, make instruction course-related so that it:
 - (a) Provides context for the concepts being taught.
 - (b) Makes the material more relevant to the student.

ADDIE, a widely-used instructional design model in education and corporate training gives us ample scope to integrate pedagogy (aforelisted), learning theories, and other ID principles in IL instructional modules.

6. ADDIE

ADDIE enables to design and develop IL instructional services based on needs analysis. The outcome of each phase serves as an input to the subsequent phase. It is a systemic model based on which several Instructional Systems Design (ISD) models have been conceived.

ADDIE, the cyclic process (Fig. 2) involves: (i) analysis of learners, their learning needs and goals; (ii) designing the learning objectives, content, exercises, and modalities for delivering the modules; (iii) development modules and decide upon the format of the content, sequence of delivery and type of learning process; (iv) implementation, deploying over the web to reach out the intended user groups; and (v) evaluation of the prototype for its accessibility and usability.

Reviewing each phase to identify the merits and demerits and/or hiccups, if any, is mandatory to evaluate the effectiveness of the ISD. Review enables fine-tuning and improving the instructional system. Fine-tuning of the instructional systems may necessitate us repetition of the processes analysis through development, thus making instructional design a cyclic process.

6.1 Analysis

The tasks to be performed during analysis phase are: (i) instructional need analysis; (ii) goal analysis; (iii) learner analysis; (iv) task analysis; (v) context analysis; and (vi) content analysis. Analysis of the learners and their learning environment are vital for instructional design. The target users and user groups, their learning needs, language preferences, accessibility to the learning platform need to be analysed. Language is



Figure 2. Instructional systems design and development process.

a decisive factor in making IL instructional programme effective. LIS practitioners need to ascertain the prime medium of instruction for stimulating learners, thereby engaging them in active and constructive learning process.

6.1.1 Instructional Need Analysis

Assessing learning or *instructional need* is a process of identifying the gap between *what is* and *what needs to be*, thereby, finding how to remedy the lack, whether it is knowledge or skills.

6.1.2 Goals Analysis

Instructional need analysis enables the designers to analyse the *course goals* that define the knowledge, skills, and attitudes to be acquired through the IL instructional programme for improved performance. Course goals for IL programmes can be: Improving the learner's ability to: search and retrieve relevant information using different tools and channels available; use information effectively and ethically for personal and professional development; and cope with the changing and complex information environs.

6.1.3 Learner Analysis

The instructional goals and anticipated outcome can be decided by the analysis of learners and their knowledge and skill gaps. Since the web-enabled delivery is preferred method to reach out innumerable audience at any time, learners' accessibility to the proposed

instructional programme and availability of required plug-in, if the modules are media-rich and media-dependent, need to be determined. Analysis is not a simple process; it is a skilled job for the LIS professionals to garner the data requisite.

6.1.4 Data Gathering Methods

Among the various data collection methods, questionnaires, observation, interviewing focus groups may serve the purpose. However, one may choose the survey method and tool-based methods on the resources depending on both staff and finances available. Data to be collected to analyse the needs are on:

- ✘ Who are the audience?
- ✘ How many are the potential learners?
- ✘ What is the need for instructional design?
- ✘ What are the current skills of the learners?
- ✘ What are the skill gaps?
- ✘ What should be the course objectives and goals?
- ✘ What are the desired outcomes?
- ✘ Where are the learners located geographically? Are learners distributed throughout a geographical location or within the campus?
- ✘ What is the preferred mode of instruction? Is it computer-aided instruction, web-enabled, audio/vedio, or library brochures?

✘ What is the preferred language?

If the time and other resources permit, one can go for assessing learner attributes in a comprehensive manner, as IL instruction modules are to be learner-centric, making learning process effective.

During learner's analysis process, focus should be on their:

Cognitive Characteristics: learning and processing styles, content knowledge, etc.

Psychosocial Characteristics: aptitude, learning motivation, attitude towards learning environment and learning content, socio-cultural attributes, beliefs, etc.

Physiological Characteristics: physical health, sensory perception, memory registry, etc.

6.1.5 Task Analysis

Task analysis involves the breaking down of the complex learning tasks into simple performance-based tasks. The learning tasks are simplified into to-do-activities that focus on gaining knowledge and skills relevant to the instructional programme or course planned for. The task analysis process enables the instructional designer to design simple learning practices aimed at improving performance, as decided during goals analysis. Otherwise one may end up designing irrelevant learning processes diminishing the chances of realising the proposed course goals.

6.1.6 Context Analysis

Context analysis involves analysing the learning environment analysis, wherein learning process takes place. During context analysis, information is collected on the learning environment available and accessible. The following data help analysing the learning context, prior to designing learning ambience, and develop learning modules:

- ✘ Do instructors and learners have access to appropriate technology and necessary support?
- ✘ Do learners have availability to the necessary plug-ins for accessing the IL modules, if rich in media?
- ✘ Do instructors have KSA (knowledge, skills and attitudes) for updating the content, in accordance with technological upgradation?

One can solicit this information either by traditional survey methods or with the aid of available online tools like discussion boards, student response systems, and other such tools that are helpful to assess the learner attributes based on which one can design the instructional modules.

6.2 Designing Learning Modules

The design phase documents specific learning objectives, assessment instruments, exercises, and content. The data gathered during analysis phase can be used for designing the instructional modules. Based on the outcome of needs analysis, the objectives and learning outcomes; the sequence and format of the modules and content instructional delivery modes and methods can be devised, which serve as the inputs for developing the IL modules.

The activities to be performed in the design phase are:

- ✘ Articulating learning objectives in performance behavioural terms.
- ✘ Developing structure of the content (content framework).
- ✘ Deciding on the evaluation strategies to be developed for assessing learning outcome.
- ✘ Selecting the instructional strategy and delivery media based on the needs analysis and learner's accessibility.

6.2.1 Learning Objectives

Learning objectives specify the anticipated outcome and/or accepted performance of the learners or participants. IL learning objectives derived from the needs analysis can be as shown in Exhibit 1.

Each learning objective (Exhibit 1) indicates the anticipated performance (learning outcome) of the participants in behavioural terms. The aforelisted learning objectives are general objectives for the IL instructional programme. Similarly, learning objectives for each module are to be developed by taking into consideration the three elements of instructional and/or learning objectives: (i) behaviour or performance to be accepted as evidence that the learner has changed; (ii) the conditions under which the behaviour will be demonstrated; and (iii) the standards or criteria of acceptable performance against which the success or failure of the learner will be judged.¹⁸ Learning objectives help in the choice of content (instructional material, instructional and learning activities, and learning evaluating procedures.

6.2.2 Content Framework—INFOSEEK

INFOSEEK, the five-faceted model is the content framework proposed for IL instructional modules. Under the INFOSEEK model, the five facets of IL structured as five learning modules are:

- (i) Information fluency.
- (ii) Search and retrieval.

Upon completion of the Information Literacy modules, learners will be able to:

- (i) **Recognise** the need for information.
- (ii) **Demonstrate** understanding of the nature of information.
- (iii) **Use** the Web, the Internet and associated information retrieval tools.
- (iv) **Adopt** best search strategy for searching and retrieving information.
- (v) **Evaluate** information retrieved based on its credibility, authenticity and currency.
- (vi) **Organise** information for further reference and use.
- (vii) **Consume** information effectively for decision-making and problem-solving.
- (viii) **Update** knowledge and **upgrade** skills in line with the changes in respective functional domains
- (ix) **Share** and **communicate** the research findings and innovative ideas and practices among peer groups.

Exhibit 1. Learning objectives.

- (iii) Evaluating critically.
- (iv) Effective and ethical use.
- (v) Knowledge building and sharing and keeping current.

INFOSEEK aims at making the participants 'information competent'. The proposed learning modules enable a learner to understand the nature of information and its various sources and formats; adopt a search strategy proceeding from simple search to advanced search procedures.

The five learning modules (Exhibit 2) aim at enabling the learners to search and retrieve information efficiently and to validate and evaluate the retrieved sources for meeting his or her information need. Further, learning content enables the learners to widen their knowledge-base by consuming information effectively and ethically and disseminate information research findings through scholarly communication.

6.2.3 Evaluation Strategies

At the design phase itself, attention is to be paid to the evaluation criteria and strategy. Designing a blueprint, giving weightage for each concept and process described in each module is essential. Deciding on the type of test (objective or subjective), type of questions (multiple choice, quiz, activities, matching the test items, labelling the components of a process, etc.) is equally significant. Each learning module needs to be designed with reflective learning activities that facilitate constructive learning among the participants.

Reflective exercises aid in formative evaluation of the learners, whereas for summative evaluation assignments, exercises, and quizzes are to be designed. Summative evaluation mechanisms, meant for assessing the IL skills

that participants acquired, are to be devised. For evaluating participant's performance a blueprint with due weightage to the content, objectives and types of questions is to be devised, which serves as a cynosure for the developers.

While devising the evaluation blueprint, weightage should be given to (i) content area (topics); (ii) objectives (Bloom's taxonomy of educational objectives—knowledge, comprehension, application, analysis, synthesis, evaluation help in constructing test items)¹⁹; and (iii) types of questions. For designing a three-dimensional blueprint, LIS professionals need to interface with the instructional designer and subject matter expert (information literacy).

6.2.4 Instructional Strategy and Media

Modes of instruction may range from stand-alone courses to online tutorials through formal class settings, small group sessions, one-on-one encounters, written guides and brochures, course-integrated instructions, audio-visual presentations, and online instructions. Since chosen mode of instruction is online, ICT is the media to be harnessed. Preferring electronic mode to impart IL offers flexible access to multiple audiences, regardless of time and space barriers. For instructional designers and developers, web-based IL instructions offer flexible content management options, enabling customisation of IL modules in different levels and formats in accordance with the learners and their accessibility and usability options. Designing a user-friendly interface that facilitates delivery of learning modules, easy navigation and access to the IL instructional modules is equally important to enhance the usability. Deciding Course Development Team and the training required for Course Team and Facilitators is also required during the analysis phase.

INFO	Information fluency
	<ul style="list-style-type: none"> Understanding the nature of information <ul style="list-style-type: none"> Information generation cycle Primary, secondary and tertiary sources of information Various forms and formats of information E-resources
S	Search and retrieval
	<ul style="list-style-type: none"> Gaining knowledge about the various information channels and search and retrieval tools Fluency with the various access tools <ul style="list-style-type: none"> Catalogues (OPAC), bibliographies, indexes and abstracts, databases, subject gateways, search engines, directories, digital repositories Adopting appropriate search strategy <ul style="list-style-type: none"> Formulating search expression Broadening and narrowing search Reformulating the search string
E	Evaluating critically
	<ul style="list-style-type: none"> Assessing the quality of information retrieved <ul style="list-style-type: none"> Credibility of <i>information provider</i> (author or publisher), and authenticity, objectivity and currency of information
E	Effective and Ethical use
	<ul style="list-style-type: none"> Consuming information for the accomplishment of tasks Conserving Copyright to avoid plagiarism Using citation styles (APA, MLA, Chicago Style etc.) for acknowledging the source(s) used
K	Knowledge building and sharing; and Keeping current
	<ul style="list-style-type: none"> Generating new knowledge in a form and format usable Communicating research results and innovative ideas among the peer groups via scholarly journals and virtual communities Keeping current with and stay informed about emerging knowledge; new developments and practices in the domain(s) interested. <ul style="list-style-type: none"> Widening existing knowledge base Registering with RSS feeds, Listservs (mailing lists), e-groups, virtual communities and subscribing to RSS feeds, e-alerts, and e-newsletters relevant to individual area(s) of interest.

Exhibit 2. INFOSEEK-IL content framework.

6.3 Development

The outcome of the design phase aids in the actual creation and/or development of learning modules in the development phase. Learning modules are developed in the form and format as decided in the design stage. The activities desired for developing modules are:

- ✘ Developing learning modules based on the delivery mode and media as decided during the design stage.

- ✘ Developing learning activities with ample scope for learners to reflective on.

- ✘ Developing assessment tools to measure learning outcome (both formative and summative).

Developing the instructional modules is a collaborative effort. The members required for the instructional programme development are:

- ✘ Library and information professionals.

- ✘ Instructional designer.
- ✘ Subject matter expert (SME).
- ✘ Content author/developer.
- ✘ Programmer/developer.
- ✘ Graphic designer/media producer.

LIS practitioners, in addition to team up with the developers, should also interface with the aforementioned team members to develop an effective IL instructional system.

6.4 Implementation

During implementation, the developed instructional materials are delivered using the chosen media. The processes involve:

- ✘ Loading the content developed into the chosen learning content management system.
- ✘ Training the facilitators and delivery team.
- ✘ Interaction of instructors and facilitators with students.
- ✘ Pilot testing the learning system and modules developed.

Various Content Development (Authoring) Tools, viz., Macromedia, Captivae, Lecora, etc., serve the said purpose. Alternatively, Learning Content Management Systems (LCMS) or Course Management Systems (CMS), viz., WebCT, Breeze, Elluminate, Moodle, Atutor, Brihaspati, etc., can be considered for managing and delivering IL modules. The choice of an LCMS should be based on its customisability, usability (ease-of-use) and compatibility with all operating systems avoiding plug-ins download for learners.

Both alpha testing and beta testing are significant to validate the developed IL modules developed. Alpha testing is meant for testing the various sub-systems, their technical compliance, and usability, before deploying "Information Literacy Modules" for use. Beta testing involves testing the validity of the IL instructional systems and modules by inviting not only participants but also external groups such as SME and/or others with similar project design and development experience and expertise. Based on the feedback of focus groups, needed amendments, i.e., refining the structure and content are to be made so as to make the IL learning modules more effective for the participants.

6.5 Evaluation

Thought evaluation appears as the final phase in the instructional design process. It starts in the design phase (preparing blueprint). Instructional or learning objectives

and evaluation strategies are mutually supporting. During evaluation phase both the instructional system developed and the participant's performance need evaluation. The CIPP (Context, Input, Process and Product) Model²⁰ is the popular model used to evaluate educational and instructional systems; whereas the Kirkpatrick's Four Level Model²¹ is the widely used model for evaluating learner's performance.

Evaluation stage is to determine the effectiveness of learning programme and grade the learner's skills. The sub-tasks involved are:

- ✘ Determining instructional effectiveness.
- ✘ Evaluating course design and materials.
- ✘ Assessing student's skills (summative evaluation using reflective exercises/activities) and awarding grades.
- ✘ Implementing revisions for improving course effectiveness.

6.5.1 Evaluating Information Literacy Instructional System

Evaluating IL instructional system is meant to assess whether the learning system facilitates effective learning and brings the desired outcome or not. Ensuring the usability and accessibility is vital for effectiveness of the instructional system. Learner interface should be evaluated for guaranteeing hassle-free navigation and usable leaning modules. CIPP, a systems model facilitates evaluation of: (i) the learning context-needs analysis; (ii) inputs—availability and adequacy of resources, viz., money, material (infra-structure) and men; (iii) process—formative evaluation of instructional programme implemented; and (iv) product—summative evaluation to gauge the effectiveness of instructional products in line with the learning objectives. CIPP evaluation model helps in strengthening the IL instructional programme; updating the content, and restructuring and redesigning the modules, if necessary, for enhanced usability.

6.5.2 Evaluating Learners' Performance

To determine learners' performance, Kirkpatrick Four Level Model accentuates to proceed through the four levels, viz., (i) reaction, (ii) learning, (iii) behaviour, and (iv) results. While designing and developing evaluation strategies and techniques to measure performance (learning outcomes) of the IL programme participants, the criteria to be considered are their:

- ✘ Capability in identifying 'sources of information'.
- ✘ Proficiency with the ICT tools and required software packages (MS Word, PowerPoint, e-mail, etc.).

- ✘ Efficiency in identifying keywords and adopting appropriate search strategy.
- ✘ Competency in using search tools and search interfaces.
- ✘ Capability in evaluating the quality of information resources.
- ✘ Fair practices adopted in conserving Copyright and Intellectual Property Rights of the creators.
- ✘ Knowledge about the citation formats, for acknowledging the resources consumed, thus avoiding plagiarism.

Whether the learning objectives set for the IL instructional programme are achieved or not need to be assessed using different evaluation techniques. Learning activities and exercises and the quizzes within the module enable formative assessment of learners. For summative evaluation, assignments, individual and collaborative group are to be devised to evaluate the knowledge and skills learners imbibe.

All the afore-discussed instructional system design and development phases are interconnected and inter-reliant and outcome of each phase serves as the input for the subsequent phase. Consequently, reviewing (Fig. 2) each phase is mandatory so as to ensure quality input to the subsequent phase. Analysing instructional need and identifying the knowledge and skills gaps of learners facilitates defining learning objectives and designing curriculum and deciding evaluation criteria and practices. Outcome of the design phase in turn facilitates developing IL modules in line with the learning objectives. The developed modules are evaluated whether the learning objectives set for the IL programme are realised or not. The entire process from 'analysis of needs' through 'evaluation' constitutes the instructional design process.

7. CONCLUSION AND SUGGESTIONS

Information literacy empowers learners with the knowledge (cognitive domain), skills (psychomotor domain), and attitude (affective domain) required for identifying, locating and retrieving relevant information using appropriate tools and sources; critically evaluating its quality, adopting needed criteria; consuming for personal and professional use by ethical means and practices.²² Information literate can be considered as 'wise consumer' and 'self-reliant' information user, laying a constructive path for his or her lifelong learning. To make library users as wise consumers of information, imparting IL is the primary task of LIS professionals. LIS practitioners can make the best use of technological tools available. In addition to Learning Management Systems, Web 2.0 tools enable designing and developing interactive IL modules.

Integration of instructional design theories and principles enables LIS professionals to engage learners through reflective, constructive, and collaborative practices duly focusing on interactivity and 'learning by doing'. Integrating ADDIE to design IL instructional systems enables LIS practitioners to develop effective learning modules. Collaboration is a prerequisite for planning, designing, and developing IL programme. LIS practitioners need to collaborate with the faculty of different disciplines, instructional designers, and developers which in turn necessitates developing a profound understanding of course design and development plans, learning theories, learning styles, pedagogical techniques, evaluation techniques to assess learning outcome, etc.

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