Teaching strategies for library instruction: directions from the literature

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ABSTRACT

This paper proposes teaching strategies and techniques for library instruction in academic libraries to achieve the intended goals. The recommendations are based on insights from previous research in library instruction with the intention to identify possible strategies and techniques for different user groups. This study applied a systematic literature review method, using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol to examine the use of teaching strategies and techniques in library instruction programs. The Web of Science (WoS) and Scopus databases were searched for relevant literature using specific keywords. Applying the inclusion criteria, a total of 27 articles out of the 1380 documents extracted, were deemed relevant to the study. The results show that library instruction is usually conducted in the form of individual sessions. Teaching strategies used by librarians include flipped classroom, faux flip, classroom teaching, research clinic, consultation, asynchronous learning, and online synchronous learning, among others. These teaching strategies improved engagement and relationships between students and librarians, while impacting critical thinking, confidence and self-directed learning. It is concluded that librarians should consider adopting and combining teaching strategies based on individual needs and use technology to improve teaching effectiveness and increase student learning. This study shows that most studies on library instruction have only partially addressed instructional strategies. A critical review of the literature revealed that a strategic shift in the management of library instruction is necessary to achieve the intended outcomes. In this study, three teaching strategies for library education are proposed, namely Embracing for freshman, Encouraging for sophomore, and Leveraging for postgraduates.

Keywords: Library instruction; User education; Teaching strategies; Information literacy instruction; Academic libraries.

INTRODUCTION

A librarian plays the role of an educator who provides users with knowledge and skills related to information literacy. This role is realized via various activities, including reference services, which are information consulting services between users and librarians. Previously, this service was only based on face-to-face consultations to address technical and general questions, but it has since become more complex, including providing instructions for conducting research, scientific writing, and supporting learning, both physically and online.

Reference librarians in university libraries are important as they support the learning and research of the entire campus community, thus they must keep abreast of developments in teaching methods, techniques, and technological media for the benefit of library users. One of the tasks of academic librarians is the management of literature and references (Rabasa and Abrizah 2022). Few systematic literature review (SLR) studies have been conducted on reference services, especially instructional services. Some of these studies address reference services via SMS (Wicaksono 2017), competencies of chat reference librarian (Luo 2007), user satisfaction with virtual reference services (Lasda-Bergman and Holden 2010), and reference chat services (Matteson, Salamon and Brewster 2011). The SLR on virtual reference/chat services does not discuss much on the instructional strategies. Studies that discuss instructional strategies include Oakleaf and VanScoy, (2011), Ogunniyi and Omobolaji (2020), Montella (2020) and Morin (2021). Given the importance of techniques and instructional skills for librarians to produce the optimal output, comprehensive studies on instructional strategies are necessary. Therefore, this study embarked on investigating the teaching strategies and techniques used in libraries as made evident in the LIS literature.

The research questions of this study are:

(a) What are the types of library instructions practiced by academic libraries?
(b) What are the teaching strategies and techniques, technology, and tools used in academic library instructions?
(c) What are the challenges faced by academic librarians in library instruction programs?

CONCEPT AND THEORY UNDER STUDY

Teaching in the library has existed since the academic library was founded. The educational function is attached to the library to provide insight and knowledge to users in accessing, evaluating and utilizing information to meet their information needs. Teaching strategies and techniques in libraries adopt the teaching techniques in educational institutions in general, both in the classroom and in e-learning. However, education in the library is rather non-formal, whereby students do not need a graded course contributing to their degree but gain new knowledge and skills from the instruction activity.

Teaching and Learning Approach

Some teaching and learning theories adopted by librarians are constructivist and social constructivist, whereby students construct knowledge through the merging process between their prior knowledge and experience and the current learning so that everyone will have a different understanding and output (Toroghi, Sanatjoo and Tajafari 2022). Constructivist learning requires teaching strategies that can support the appearance of collaboration and problem-based learning (PBL) that triggers the active participation of the students in which the teacher plays a role as a facilitator, not as an instructor (McLeod 2019). Constructivism is a breakthrough in the world of education, in which the focus of education was behaviorism. teaching and learning approaches could be summarized into behaviorism, cognitivism, and constructivism (Loveless 2022). Table 1 summarizes the characteristics of common learning approaches, based on various theories of learning.

Understanding the teaching and learning approach helps an educator determine the teaching strategies used during learning, which are mainly used in formal education from the lowest level (playgroups) to higher education, including homeschooling and distance

learning. Learning approaches for specific needs, such as library instruction/user education activities, are still rare.

Table 1: Characteristics of Teaching and Learning Based on Three Theories of Learning

Behaviorism	Cognitivism	Constructivism
Clear goals/objectives	Learner-centered	Two-way active dialogue
Repetition, drill, and practice	Cognitive readiness of individual	Teacher becomes facilitator
Does not take into account reasoning	Progressively Constructed	People learn through active participation
Stimulus-response	People are a source of information	Cooperative and collaborative
Extrinsic motivation	Intrinsic motivation	Project-based learning
Testing to measure success in learning	Problem-based learning	Case-based learning
Mind is a black box	Scaffolding modeling	Metacognition
Knowledge is outside of the learner	People learn by observing	Actively construct student knowledge
The student is blank and needs to be filled	People learn through social interaction	Zone proximity development, coaching, modeling
Direct instructions	Attribution theory	Discovery learning
Programmed instructions	Cognitive development	Set learning

The three common learning theories (behaviorism, cognitivism, and constructivism) presenting the characteristics of teaching and learning in Table 1 can be further elaborated to include social constructivism and humanism (Figure 1). The addition of humanism and social constructivism approaches deals with self-determination learning, value and users' potential. That approach fulfills the previous learning approach that focuses on changing behavior (behaviorism), use past knowledge and memory (cognitivism), and construct the knowledge through experience (constructivism). Figure 1 also depicts several examples of learning strategies relating to each type of approach.

The principles, beliefs and ideas used in teaching and learning affects the teaching methods, strategy and technique. The five teaching and learning approaches are widely used in both online and face-to-face library instructions.

Teaching Approach, Method, Technique, and Strategy

It is important to first understand the distinction between teaching approach, method, strategy, and technique. Hasanova, Abduazizove and Khujakulov (2021) define teaching approach as the universal view or principles held by the instructor. These principles then lead the teacher to develop a teaching method, or set of procedures that assist in achieving the intended aims of the instruction. Once the method is determined, the teacher may then decide, based on the characteristics of the students and classroom, the teaching strategy or plan to be undertaken for the lesson. The teacher and learner may then apply a unique technique as a way of carrying out a task suitable to the strategy applied. Figure 2 depicts the distinct four layers of teaching, regardless if it is teacher-centered or student-centered.

The outer later, the teaching approach, refers to the worldview of a teacher, which affects their teaching method, strategies, and techniques. The second layer is the teaching method which includes procedures, techniques, and methods taught; in other words, the teaching method refers to a principle commonly used in instruction, such as student-

centered or teacher centered. On the third inner layer is the teaching strategies that include activities, study, teaching, and practice, for example, small group discussions and classroom teaching. Finally, at inner most layer, is the teaching technique which is the method used to deliver the learning process, which includes lectures, discussions, and talks (Hoque 2016).

TEACHING & LEARNING APPROACH	• TEACHING & LEARNING STRATEGIES
Constructivism/Student-centered learning	•Flipped Classroom •Research Clinic / Faux Flip •Asyncronous Online Instruction •Adaptive Comparative Judgement
Social Constructivism	•Consultation
Behaviorism	•Classroom Teaching •Integrated Library Instruction •Online Syncronous Teaching
Cognitivism	•Online Discussion •Critical LIbrary Instruction •Cognitive Apprenteship Model
Humanism	•Experiental Learning •Roving Reference

Figure 1: Teaching and Learning Approaches and Strategies Classification

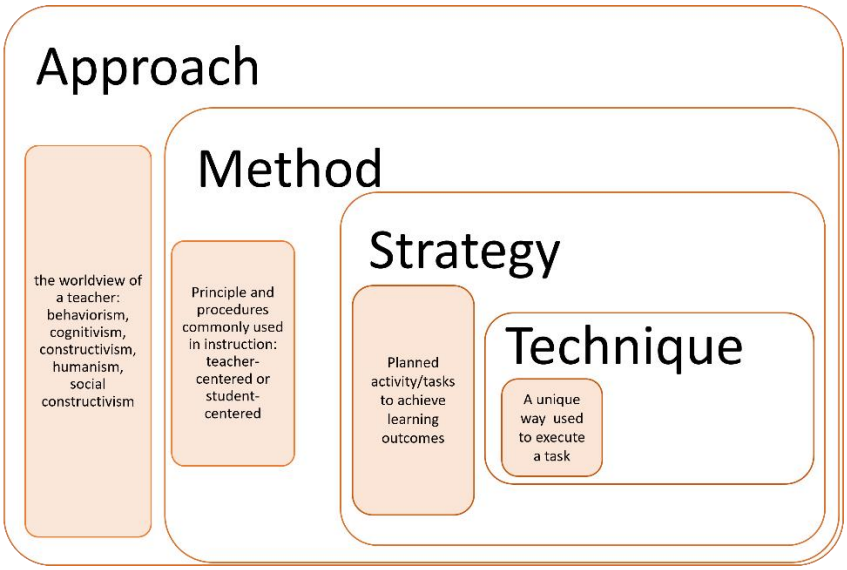

Figure 2: Relationship between Teaching Approach, Method, Strategy, and Techniques

Library Instruction

Modern library instruction began when Melvil Dewey considered the academic librarian as an educator who utilize library materials and those beyond the library building to instruct users on how to use books (Cisse 2016). The librarian's teaching role is evolving, and academic librarians are now more confident in teaching their users, although the emergence of information literacy has made library instruction more complex. However, many librarians are still using the traditional or teacher-centered style with online database demonstrations. Six basic library instructions have been discussed, namely, bibliographic instruction, which focuses on the library catalog; library orientation (for physical libraries); library instruction, which creates awareness of resources and library services usually conducted as a one-shot session; course-integrated instruction, which is similar to teaching users on the use library resources and services with assignments; credit-bearing courses on a topic; and information literacy instruction which is the most complex (Cisse 2016). In real library practice, the term "library instruction" is a general term referring to all teaching that occurs in a library, whether in the context of library observation, information literacy instruction, or bibliographic instruction.

METHOD

Search Strategy

This study used the SLR method to critically review and analyse data obtained from the Web of Science (WoS) and Scopus databases. These two databases were chosen because they are leading indexing databases covering various fields of science, including library and information science, social sciences, and education. Both WoS and Scopus have stable and consistent growth of publication and citations, and the databases show a stable coverage of five major disciplines, one of which is social sciences and humanities (Harzing and Alakangas 2016). The search was conducted on April 21, 2022, using the keywords "reference service," "library instruction," "user education," "information literacy instruction," "information literacy service," and "library" (Figure 3). The search results obtained 998 documents from the Scopus database, while the WoS database using the exact keywords produced 382 results (Figure 4).

Scopus search string

TITLE ("reference service" OR "library instruction" OR "user education" OR "information literacy instruction" OR "information literacy service" AND library) AND (LIMIT-TO (PUBSTAGE, "final")) AND (LIMIT-TO (PUBYEAR, 2022) OR LIMIT-TO (PUBYEAR, 2021) OR LIMIT-TO (PUBYEAR, 2020) OR LIMIT-TO (PUBYEAR, 2019) OR LIMIT-TO (PUBYEAR, 2018) OR LIMIT-TO (PUBYEAR, 2017) OR LIMIT-TO (PUBYEAR, 2016) OR LIMIT-TO (PUBYEAR, 2015) OR LIMIT-TO (PUBYEAR, 2014) OR LIMIT-TO (PUBYEAR, 2013)) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English"))

Web of Science search string

("reference service" OR "library instruction" OR "user education" OR "information literacy instruction" OR "information literacy service" AND library)

Figure 3: Search String used in Search Strategy

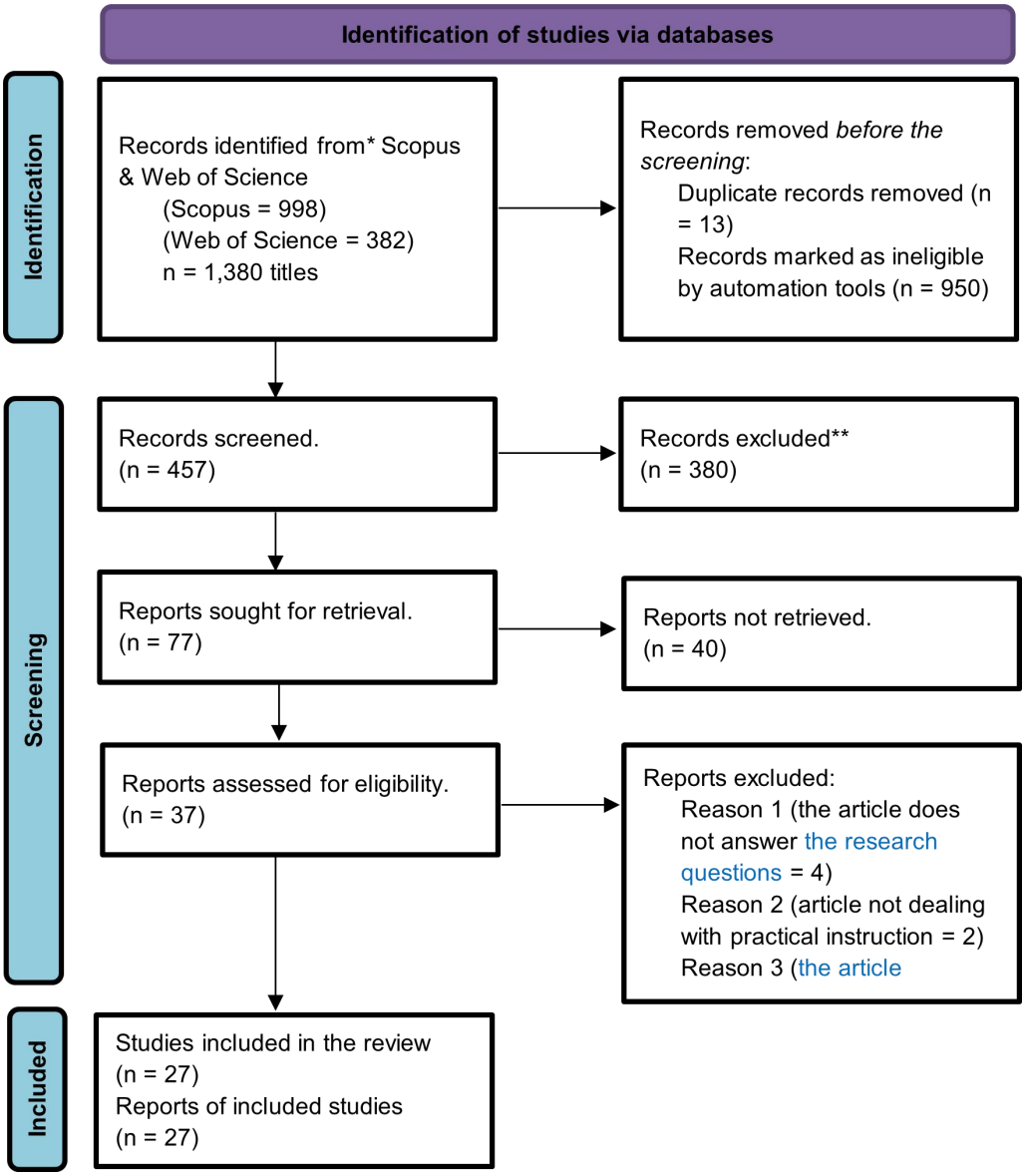

Figure 4: Manuscript Search Flow Using PRISMA Protocol: (adapted from Page et al. 2019)

Data Extraction

The extracted data comprised articles with a total of 1,380 titles. After system filtering for duplicates, 457 articles remained. A title screening for relevant articles left 77 article titles. Full-text search results were obtained (37 titles), and several articles could not be found because of the following factors: the library did not subscribe to that journal, broken links, or articles could not be found. The inspection process is by reading the full text carefully and highlighting the main idea related to research question. After inspection of the articles, 27 titles remained, while the other ten were considered inadequate because they did not answer the research question accurately (Figure 4).

Data Inclusion and Exclusion

The data inclusion was limited to the following criteria: Written in the past ten years (2013–2022); original articles, written in the English language, excluded were article reviews and book chapters, articles in press, and the education subject because the focus

was on real case studies, research, experience from library, and real-world information. Also excluded were articles not related to or not answering the research question.

Data Processing

All articles were processed using ATLAS.ti version 9. In this process, articles were reviewed and then determined the code according to the research question, under the categories of seeking information about instructional strategies, the media used, and challenges in implementing instructional activities in the library. After coding, the codes were analyzed by grouping them by category and based on the pre-existing learning theory, that is, behaviorism, constructivism, cognitivism, and humanism. Furthermore, after main categorization, these categories were subdivided into sub-themes and themes. To group and code data according to learning techniques and strategies, theories, concepts, and research results on teaching and learning based on the theories of teaching and instruction were used.

Risk of Bias

The titles of articles included in the study were based on manual screening by the researchers. To minimize bias in selecting the articles, the review process started with three researchers independently reviewing the title, abstract, and article contents after the data were successfully extracted. All the researchers had a library and information background to make the review process easier.

FINDINGS

Library Instruction Program

From the results of the reviewed full-text, three categories were obtained, namely type of library instruction program; type of teaching strategies and techniques; and the challenges when librarians conducted the library instruction session. There were 181 codes generated from 27 articles. Then, the codes were analyzed and grouped according to the research questions. Research question 1 identified the type of library instruction program, material, and audience of the library instruction session. Library instructions were carried out in university libraries, polytechnics, colleges, and research institutions worldwide, and each library adopted its program name based on the institution's vision and mission (Table 2). The names used included library instruction (Berg 2018; Teague 2019), information literacy (Carroll 2016; Parramore 2019), inquiry-based learning (Sullivan, 2014), and library competency workshops (Rivera 2015). Almost all the library sessions were one-time sessions for a duration between 50 and 110 minutes (Rodriguez 2016; Whitver and Lo 2017; Berg 2018; Budhai and Williams 2021; Cowden et al. 2021; Morin, 2021). However, there was also a shared program for 2 to 5 sessions, with a duration of 50 to 110 minutes (Carroll 2016; Tomaszweski 2021). The library instruction programs were mainly targeted to 1st-year and 2nd-year students (Carroll 2016; Kaneko 2018; Budhai and Williams 2021; Morin 2021). For the first-year students, the material given focused on the introduction to the library, search strategy, scientific database, information source evaluation (Tomaszweski 2021), scientific writing (Budhai and Williams, 2021), identifying fake news, searching the catalog (Marchis, 2018), corporate media, media introduction (Tewell, 2018), and introduction to the campus (Morin, 2021), and the 2nd-year students were taught about dissertation search (Homol, 2018), subject searching, library research, finding full text, argumentative writing, research paper, and plagiarism (Gariepy, 2016). The library instruction program also aimed to introduce the student to campus life. Therefore, librarians had different teaching strategies compared to regular lecturers.

Table 2: Types of Library Instruction Program

No	Source	Type of Library Instruction Program	Duration	Content	Audience
1	Baroody (2022)	Virtual Escape Room	50 minutes: Asynchronous game, puzzle, and tasks	Library orientation, information searching, introduce library resources	All students
2	Tomaszweski (2021)	Asynchronous: One-shot library Instruction	Two one-hour sessions	Introduction to the library; website evaluation; searching strategies with databases; resources with APA citation style	1st-year students
3	Budhai and Williams (2021)	Online information literacy	Single session of virtual library instructions	Assistance in technical writing	1st-year students
4	Morin (2021)	One-shot library Instruction	110 minutes	Introduction to library and campus life	1st-year students
5	Cowden et al. (2021)	One-shot library Instruction	1 hour	Paper doesn't mention material	
6	Huber (2021)	Visual literacy instruction/visual literacy skills	Five learning sessions	Developing career vision board; assessing vision board; developing visual resumes; visual assessment of resumes; visual assessment boards.	Engineering & Technology student
7	Teague (2019)	Library instruction & information literacy	Paper doesn't mention about the program duration	Research processes; introduction to libraries; search strategy; knowing facts; how to utilize information literacy; how to conduct research	1st-year students
8	Koelling and Townsend (2019)	Large-scale information literacy	75 minutes	Research project	1st-year students
9	Parramore (2019)	Information literacy online	Own-time and face to face meeting	Search technique	All students
10	Azadbakht (2019)	Academic library instructions	Paper doesn't mention about the program duration	Paper doesn't mention material	Medical student
11	Berg (2018)	Library instructions	50 minutes with hands-on	Core library resources & services; search library materials; Using library databases; Evaluating websites	1st-year students
12	Homol (2018)	Library instructions for large students	Three libraries of webinars	Boolean operators; search phrases; finding full text; finding dissertations; keywords vs. subject searching; using database thesaurus; library research	Online graduate student

No	Source	Type of Library Instruction Program	Duration	Content	Audience
13	Kaneko (2018)	University library instructions	Up to 3 hours to finish a task	Basic information; library services; search techniques; other	1st-year students
14	Watts (2018)	Online tutorial/ asynchronous online instruction	Asynchronous learning, anytime	Chunking information about library information literacy	Undergraduate students
15	Marchis (2018)	Library workshop	2–7-minute video	Identifying fake news; using unique collection; primary sources; searching catalogs; searching databases; source evaluation	1st-year students
16	Tewell (2018)	Critical library instructions	One-shot lesson	Classification; search examples; academic access; corporate media; alternative media	1st-year students
17	Whitver and Lo (2017)	Library instruction classroom	50–75 minutes	Academic writing; editorial and publication process; determining source credibility	1st-year students
18	Poggiali (2018)	Library instructional videos	Animation teaches students and answers questions (anytime)	All library instruction topics	All students
19	Gibeault (2016)	One-shot library Instruction	Online forums	Website credibility	All students
	Gariepy (2016)	Student-integrated library instructions	Four-unit class	Writing argumentative research papers	2nd-year students
20	Carroll (2016)	Library instructions	1–2 class periods	library resources; library research	1st and 2nd grade
	Tomkins (2016)	Information literacy	Complete online modules; quizzes; group work	Information literacy topic	Health Science students
21	Ha and Verishagen (2015)	Credit-based online information literacy	Paper doesn't mention about the program duration	Paper doesn't mention material	1st-year Polytechnic students
22	Rivera (2015)	Library competency workshop	5-minute video; Weeks 2–6, watching videos	searching a library online catalog; website evaluation; plagiarism; database searching	All students
23	Johns (2014)	Library instructions	Paper doesn't mention about the program duration	Role of librarian; LibGuide; strategic borrowing	All students
24	Rodriguez (2016)	Library instruction for a large class	75 minutes face-to-face & 45 minutes online module	Types of literature; evaluating sources; search; database subject; peer review	1st-year students
25	Sullivan (2014)	LI inquiry-based learning	Engage longer with class	Information retrieval; database search	All students

Teaching Strategies and Techniques

The teaching strategies used by librarians can be divided into three teaching strategies under five learning approaches. The learning techniques were derived from the learning strategy, technology, and tools used in the library instruction program (Table 3). The teaching strategies of librarians varied based on learning theories, among which the most popular was constructivism (active learning), which is student-focused learning (Andriotis 2018; Berg 2018; Watts 2018; Tomaszweski 2021). Social constructivist learning by Vygotsky asserts that learning is a process of social exchange between one person and another so that there is an interaction between teachers and students, including the environment (McLeod 2022). Cognitive learning also appears as a foundation of a learning strategy that is critical thinking to express ideas and practical experience through online forums. Behaviorism is shown with the implementation of classroom teaching and lectures showing direct instruction in the learning process (Omeluzor et al. 2017; Budhai and Williams 2021). Lastly, humanism emphasizes learning from experience or learning by doing (Kaneko 2018). This shows that learning activities in the library are increasingly complex and varied, depending on the university students' backgrounds, teaching abilities of librarians, classes held, level of education of students, and materials presented.

Table 3: Teaching Strategies and Techniques

Teaching & Learning approaches	Teaching Strategies	Teaching Techniques
Constructivism/ Student-centered learning	Flip classroom (Campbell, Matthews and Lempinen-Leedy 2015; Maddison 2015; Rivera 2015; Carroll 2016; Rodriguez 2016; Koelling and Townsend 2019; Onah, Momohjimo and Ebubechukwu 2021)	The teacher provides videos & worksheets Small group work The teacher walked around to answer questions Students teaching their classmate Individual assignment Research-based assignment Pecha Kucha Just-in-time instructions
	Research clinic, aka Faux flip (Koelling and Townsend 2019)	Session outside class Students are free to choose what they want Introduction -warm up-work with assistance-reflection-finish; Students bring their projects and work during clinics
	Asynchronous online instructions (Adetayo 2021; Tomaszweski 2021)	Self-directed learning Problem-based
	Adaptive comparative judgment (Huber 2021)	Assessment based teaching
Behaviorism	Classroom teaching (Johns 2014; Gibeault 2016; Omeluzor et al.2017; Tewell 2018; Azadbakht 2019; Oberlies, Buxton and Karpinski 2020; Morin 2021)	Caring Use of images & graphics Culturally responsive teaching Expressing interest in student research Offering availability outside the classroom Learning student names Incorporate humor
		Adjusting Teaching Technique Encouraging students to ask questions Teaching without cultural bias Breaking the class into small groups; Conveying to do her/his best to assist the students Storytelling
	Integrated library instructions (Berg 2018; Budhai and Williams 2021)	Research-based assignments Completing a worksheet

	Online synchronous teaching (Whitver and Lo 2017; Budhai and Williams 2021)	Teaching presence in an online environment Check in with the student regularly Asking the student Sharing the topic on the screen Direct instructions
Social Constructivism	Consultation (Homol 2018; Koelling and Townsend 2019)	Web conference consultation Synchronous meetings via telephone or conference Recording the session Live searching and demonstration Q&A via chat Librarian's presentations; One-on-one mentoring Small group consultation (offline) Problem posing discussion & dialogue; group work; Scaffolded instructions Reflection
Cognitivism	Online discussion (Tewell 2018; Budhai and Williams 2021)	Online forum/Web-based forum Thoughtful feedback
	Critical library instruction (Whitver and Lo 2017; Tewell 2018; Azadbakht, 2019; Tomaszweski 2021)	Consultation with the small group/reflection Discussion & dialogue Group work Problem posing Role-playing Encouraging students to think. Asking questions Giving exercises & showing a video. Student challenge
	Cognitive Apprenticeship Model (Tomkins 2016; Oberlies, Buxton and Karpinski 2020)	Cognitive apprentices Classroom practice Scaffolding Coaching
Humanism	Experiential Learning (Kinsley, Brooke-Hill and Maier-Katkin 2014; Ha and Verishagen 2015; Montgomery 2015; Kaneko 2018; Sullivan 2018; Tomaszweski 2021)	Experiential learning Hands-on experience Asking pre-assessment questions Lectures Demonstration Individual activities Teachers stay at the front; they walk if students ask questions. Paired activities Encouraging discussion and reflection. Ensuring student engagement Giving the student time to experiment. Creating an inviting classroom environment
	Roving Reference (inquiry-based learning) (Gibeault 2016; Sullivan 2018)	Tours Good reader for pdf annotated. Barcoding all stuff Shortcut to the library web Experiment with an approach to the problem

Tools and Technology in Library Instruction

Six categories of information technology were identified, namely multimedia, interactive games, social media, teleconferencing, learning management systems, and assessment tools (Table 4). Multimedia is related to learning content/materials in the form of videos, animations, web pages, libraries, multimodal literacy and toolkits, graphics, and video projectors. Librarians widely use multimedia to provide material in an attractive and easily digestible form. Besides multimedia, interactive games are also widely used in library instruction, such as quizzes, bulletin board pallets, online quiz software, puzzles, and

notecards. This game made learning more fun and relaxed, subsequently fostering greater teacher-student interaction (Montgomery 2015; Carroll, Tchangalova and Harrington 2016; Watts 2018).

Social media is also the main attraction for librarians to distribute learning materials through WhatsApp groups, YouTube, content delivery tools, and Web 2.0 tools (Watts 2018; Shire and McKinney 2021) Virtual instruction is also carried out using teleconferencing tools and learning management system applications such as Google Classroom, Edmodo, canvas, soft child, play post, and near the port. For the assessment, rubrics and jigsaw models are used (Johnson and Barrett 2017).

Table 4: Tools & Technology and Benefits of Library Instruction

Teaching & Learning approaches	**Tools & Technologies**	**Benefits**
Constructivism / Student-centered learning	Online video modules; in-house videos; library instruction videos; short-bite-size video; rubrics; worksheets; Canvas libraries; laptops for groups; flash drives; PPT; paddled bulletin boards; Moodle; online instruction module	Students have more confidence and positivity. Students learn library orientation quickly. Students can revisit the video Students engage in self-directed learning Students gain additional hands-on learning Students are able to reach Bloom's taxonomy Students' scores improve Information literacy is enhanced Students actively engage
	Springshare local (learning management systems)	Students enjoy one-on-one interaction Flexible approach from different settings Relies on individual research consultation Relationship between students and the library is enhanced
	Web simulation; screencast videos; static website; animation videos; animated characters; Powtoons; Goanimate	Instruction is designed based on adult learning or andragogy Students enjoy the video Animation is a productive medium
	Active learning modules; adaptive comparative judgment software	Students are motivated with their assignments Students practice virtual literacy articulation Increased learning outcomes
Behaviorism	E-mails; costumes & props; worksheets Simple image & graphic in classroom; colorful & engaging classroom; interactive multimedia; infographics as handouts; graphics to generate keywords	Relationships between librarians and students are improved Promote caring relationship Accommodate cultural diversity among students Better and more engagement Create a positive environment Encourage creative thinking Attract students Engaging teacher Assessment learning
	Microsoft Teams; video tutorials; Blackboard collaborated learning systems; Zoom meetings; pdf forms; PowerPoint slides	Add human sense to online instruction.
Social Constructivism	BlueJeans (web conferencing); SpringShare local products; introductory videos; webinar slides in Googledoc;	Increase engagement Increase students' understanding Students enjoy one-on-one interaction. Flexible approach for many different settings Focus on an individual research project Enhance the relationship between student and librarian

Teaching & Learning approaches	Tools & Technologies	Benefits
Cognitivism	Online forums on Reddit.com	Encourage critical thinking and self-monitoring Eliciting feedback Modeling behavior for long-life learning Higher-level reasoning Assists in working with students at different levels Corrects misunderstanding Helps students into the domain of library resources Students have the opportunity to do research
Humanism	Apps on mobile devices; quizzes consist of experiential content; library adventures: unveil the hidden mysteries; quizzes, puzzles, QR codes	Engage students for a longer duration The learner can experiment with apps and other search strategies.
	iPads; used tablets for teaching; instructional videos; workstation for sync & charging; customized home screens; credo; learning management systems	Enhance engagement More collaborative Students enjoy the video Powerful media

Challenges to Library Instruction

In addition to the intensive use of learning technology, challenges during learning also arise from the side of librarians, students, organizations, and technology (Table 5). The challenges faced by librarians mainly concerned pre-work assignments, students' cameras being turned off, lack of technological skills, lack of motivation and interest, lack of time, high student expectations of learning materials, lack of training, and requires much time (Omeluzor et al. 2017; Fernández-Ramos 2019; Budhai and Williams 2021). Challenges from the organization included the organization's high expectations for the library instruction program to improve student skills, financial and technological limitations, limited human resources, limited policies for implementing learning strategies in the library instruction program, and miscommunication about schedules. The challenges related to students included not being asked to take part in learning, not doing pre-assignments; not taking lessons not understanding the term "library," not mastering information technology, technophobia, and not seeing videos when learning starts (Onah, Momohjimo and Ebubechukwu 2021). The technological challenges included low internet bandwidth and a lack of Microsoft Teams.

DISCUSSION

Several studies suggest that the existence of library instructional can improve students' ability to complete university education (Gaha, Hinnefeld and Pellegrino 2018; Dahlen and Leuzinger 2020; Duffy, Rose-Wiles and Loesch 2021; Rowe et al. 2021), and agree on the benefit of library instruction in university libraries. Thus, librarians should explore the ideal learning strategies to achieve optimal results. Here we can see the distribution of strategies and teaching methods in university libraries ranging from behaviorism, cognitivism, and constructivism approaches with various derivatives. The related literature revealed five instructional approaches, namely constructivism, social constructivism, behaviorism, cognitivism, and humanism. Those findings were identified based on the three learning theories (behaviorism, cognitivism, and constructivism) and its derivative, also from learning strategies and techniques from previous studies.

Table 5: Challenges during Information Literacy Sessions

Category	Challenges
Librarian	Material-related (Arnold-Garza 2014; Omeluzor et al. 2017; Fernández-Ramos 2019; Budhai and Williams 2021; Onah Momohjimo and Ebubechukwu 2021) Assign pre-work Camera being off Inadequate technological skills Lack of motivation and interest
	Time-related (Johns 2014; Omeluzor et al. 2017; Koelling and Townsend 2019; Teague 2019) Lack of time Scarcity of time and training Time consuming Time constraints
	Teaching skills-related (Berg 2018; Tewell 2018; Koelling and Townsend 2019; Buddhai and Williams 2021) Excuse for continuing poor teaching Teaching the basics Lack of communication between librarian and instructor Cannot manage own work Student expectations Indirect answers to student questions Ignoring student disruption Not being able to gauge facial expressions
Organization	Faculty expectations (Tewell 2018) Institutional roadblocks (Tewell 2018) Lack of financial and technology resources (Fernández-Ramos, 2019) Lack of policy on adopting a flipped classroom (Onah, Momohjimo and Ebubechukwu 2021) Miscommunication about the clinic schedule (Koelling and Townsend 2019) Shortage of librarians (Omeluzor et al., 2017) Requires larger time investment (Arnold-Garza 2014) Limitations of Microsoft Teams (Buddhai and Williams 2021) Low internet bandwidth (Onah, Momohjimo and Ebubechukwu 2021)
Students	Lack of interest (Omeluzor et al. 2017) Students who do not understand information literacy as a whole (Teague 2019) Students do not do the pre-assignment (Arnold-Garza 2014) Cannot catch up(Arnold-Garza 2014) Students who are not tech savvy (Teague 2019) Students who do not understand library terminology (Teague 2019) Lack of interest in the session (Berg 2018) Students do not watch the video (Berg 2018) Technophobia (Onah, Momohjimo and Ebubechukwu 2021) Limited students' time to experiment (Ha and Verishagen 2015)

a) Active Learning / Constructivist Learning

Library instruction activities focus a lot on providing education related to improving student skills in presenting information orally and synthesizing information (Dahlen and Leuzinger 2020). The traditional method is lecturing, where the teacher is at the focal point of the process. However, this method is ineffective because students sometimes do not pay attention to the material and are bored (Lorenzen 2001). Thus, librarians adopted the constructivist approach, where students are at the center of learning and are motivated to be active. Studies have already been conducted on the use of active learning in library instruction(Lorenzen 2001; Poole 2011; Campbell, Matthews and Lempinen-Leedy 2015; Montgomery 2015; Huber 2021; Humrickhouse 2021). Student engagement is essential in active learning, for example, by using the flipped learning method in library instruction (Arnold-Garza 2014; Campbell, Matthews and Lempinen-Leedy 2015; Maddison 2015; Rivera 2015; Carroll 2016; Rodriguez 2016; Onah, Momohjimo and Ebubechukwu 2021), or flip method development (Sun, Wang and Ning 2018) and research clinic with a faux flip name (Koelling and Townsend 2019). Libraries widely adopt the flipped classroom to increase student engagement, develop students' most authentic selves, improve value, make it easy to repeat material, and many other benefits.

The student-centered approach involves the teaching technique of asking questions and having group discussions. One of the purposes of using the question-asking technique is to foster critical thinking in students and discourage memorizing only (Magrabi, Pasha and Pasha 2018). To support this, an instructor must have the ability to formulate questions that can encourage students to think critically and that contain problem-solving. Librarians should also encourage students to ask further questions in each session using the correct technique to feel comfortable and confident when asking questions. For example, in Ting and Ried's (2022) study, doctors, as the parties with much knowledge related to medicine, encouraged patients to ask questions. Instructor-student relationships that have gaps in knowledge and skills sometimes make students feel afraid or hesitant to ask questions; therefore, a quiet class does not mean that all students understand the material being taught. By asking questions, students can increase their understanding of the studied topic.

However, sometimes the question-and-answer (Q&A) method is still less effective when compared to group discussions in the context of achieving results (Bagheri et al. 2022). Therefore, many active learning approaches use teamwork, group discussions, and thinking in pairs to improve student understanding. Nevertheless, the group discussion approach does not always produce significant improvement, as found in an English class in the Philippines by Tan et al (2020). Barriers to implementing group discussions that need to be considered include the class being noisy, not all students being active, only active students participating, and taking a long time to implement group discussions (Susanto 2022). There are still few studies that discuss the use of group discussion learning methods in library instruction. However, this method can be combined with other active learning methods.

Presentation is one of the effective teaching methods for students to understand the material, as student presentations help them develop more confidence and help instructors assess students' understanding directly. Presentations and teaching in class prepare students by studying the material being taught more seriously so that they eventually understand the material being taught. Student presentation-based teaching makes students more active and can hone their leadership spirit in mastering materials and managing classes (Pawan 2022). In learning, the teacher does not only focus on hard skills but also on soft skills, including critical thinking, communication, and leadership, all of which can be done using appropriate teaching methods. However, the student-active

teaching approach is still rarely used by teachers (Tyagi et al. 2018) , especially in one-shot library instruction.

b) Social Constructivist Learning

Other teaching methods within social constructivism are scaffolding and consultation, where learning requires an instructor/tutor/trainer to achieve the goals. Learning using the social constructivist approach requires interaction or the help of others. Computer-based scaffolding techniques strongly support information literacy and help students build arguments (Kim, Vicentini and Belland 2022). The teacher's role in helping students learn to explore, evaluate, and think critically is crucial. Students who enter the university world can become confused and afraid; therefore, teachers/ instructors should play a role in helping them learn information literacy before being released into the world of learning. Thus, the instructor's function, as in engineering scaffolding, is that of a mentor for students before they are independent and can work on their own. He/she teaches from basic to advanced steps as a scaffolding mentor. Scaffolding is not only in the form of mentoring but also in the form of a toolkit and hands-on activities, which show the step-by-step process of doing information literacy. Durham (2020) designed a toolkit to be used as scaffolding in learning information literacy. Montella (2020) also utilized instructional scaffolding in learning information literacy in managed academic libraries. One-on-one mentoring is good in virtual and face-to-face formats, increases engagement, increases student understanding, provides comfort, and supports flexible learning according to settings. Social constructivism has many positive effects on learning because students are personally mentored and given appropriate scaffolded instructions with achievement per individual so that they can better understand the material being taught. However, librarians also need considerable time to serve the students.

c) Cognitivism

Cognitive learning puts forward the thought process of learning. Where the learning process is carried out by incorporating knowledge and previous experience and processing it in the minds of the learners. In this case the prior knowledge possessed by the learner has an important role, so that the output of each person will be different even though they receive the same material. The learning strategy goes with the cognitive approach such as dividing learning material into small portions (chunking), promote repletion to build certain thoughts, and explaining in detail with the intention of increasing memory and understanding. Several strategies that related to cognitive skills in library instruction include conducting online discussions (Tewell 2018; Budai and Williams 2021), critical library instruction (Whitver and Lo 2017; Tewell 2018; Azadbakht, 2019; Tomaszweski 2021), and cognitive apprenticeship (Tomkins 2016; Oberlies, Buxton and Karpinski 2020). One of the goals of library instruction is to instill critical thinking skills for students, and with the cognitivism approach it is hoped that this will encourage students' critical thinking. The cognitive approach is like information processing of computer. In which there is input, process, and output. Since the learners' cognitive learning style are different so it is good if instruction is delivered in individualized and effective way (Fan 2005).

d) Humanism

Experiential learning and roving reference also emerged as one of the learning strategies in library instruction using a humanistic approach. Experiential learning places much emphasis on experimentation, exploration, and game-based experience. It is widely used to provide practical skills where students learn by doing and are taught using practical learning techniques (practice learning techniques). Through experiential learning, students

can be more motivated and optimistic about the material and improve their practical skills (Franco-Valdez 2018). Nevertheless, implementing experiential learning has several challenges, including low student participation and access to laboratories and the internet, and low participation in workshops (Obi and Ufondu 2021). The application of experiential learning in library instruction is still rare, which is an opportunity considering that the experiential learning output is in the mastery of skills.

e) Behaviorism

The behavioral approach is demonstrated by the traditional teaching strategies of classroom teaching, both online and offline, hands-on, and "show me," which all lead to a change in behavior. Behaviorism is crucial for changes in student abilities by predetermined expectations or learning outcomes. This behavior change becomes a measure of learning success. Therefore, the activities that support this behaviorism include orders/instructions to work accordingly, do exercises, practice, and demonstrate. Learning directly in front of the teacher face-to-face is essential because being stunned must always be supervised and controlled. Many say that pedagogy in libraries is different from formal education in universities; therefore, learning in libraries should also be made a little informal and more caring, and many activities should be learned by doing or through mistakes (Bicknell-Holmes and Hoffman 2000), using much humor and comedy (Walker 2006; Azadbakht 2019). Humor makes the class relaxed, and students are not tense, making it easier to receive the material. Humor also increases student engagement in the classroom. The library instruction session can also be used as a caring program for students. Through this program, the library tries to embrace students into the campus world, and caring instruction strategies can make students feel comfortable (Morin 2021).

Teaching Strategies for Library Instruction

The library instruction session provides many alternatives to teaching techniques that librarians can adopt. Librarians can adjust appropriate and effective methods to achieve the goals of library instruction. Library instruction differs from formal lecture classes, and many library instructions prioritize one-shot sessions, or several sessions per topic, in contrast to formal classes where learning is continuous, throughout the semester. The strategy used in a one-shot or face-to-face consultation also dramatically influences the results. Based on the result analysis above regarding the teaching strategy in libraries, the researcher recommends learning that can be implemented in the library if a library applies flip classroom learning to increase student engagement; however, in reality, teachers experience some obstacles, namely, students not seeing or learning the material given beforehand (so, when they come to class, they are not ready for the next lesson because they do not know the material), students not doing pre-assessment independently before class, and flip classroom learning requiring technology and internet connection to download materials provided by the librarian. The demanding flip classroom method requires students to be active, but sometimes first-grade students are not yet used to the learning system. However, learning through classroom teaching requires extra strength on the part of both the teacher and the students, as students do not feel moved to actively follow the learning process because they are passive. Educational approaches that involve social interaction have a significant impact on the connection between a librarian and the students. One-on-one consultation allows the librarian to learn about users' needs, and users will gain expected knowledge and skills, thus forming a relationship and engagement. However, with the number of students in a university, one-on-one consultation is time-consuming for the librarian. The librarian could use the chunking format, namely providing the theoretical information in small parts so students can choose the material they need. The material is presented online in a short but clear format so that students can study

anywhere fast without waiting for timetable learning; if there are things they do not understand, they can consult the librarian. With one-on-one instruction, one librarian must serve one student; one-on-one instruction can include a small group of students (2–4) served at the same time by the librarian. However, intensive attention by the librarian is still required. One-on-one instruction is considered very effective for the upgradeability of academic and student skills, especially in reading and writing. In-class literacy information reading and writing in a scientific context is one of the theories mainly taught.

Proposed Teaching Strategies for Library Instruction

Based on the above discussion, the researcher recommends some learning strategies according to student-level characteristics because one learning strategy may not be suitable for all students as their characteristics and learning styles differ. The next subsections outline the purpose of a learning strategy for library instruction based on student grades. Three successful learning strategies were identified in this study (Table 6). The strategies proposed are based on some characteristics that are presented in the earlier tables. It combines the library instruction program, the duration, and the audience (Table 2), and the strategy (Table 3), technologies and benefits of the instruction (Table 4), and challenges (Table 5). The strategies are proposed based on the study level of the students, namely the freshman (first year student), sophomore (second year student), and graduate (master or postgraduate student).

(a) Embracing library instruction for freshmen

The first strategy is embracing library instruction for first year students, or freshmen who are still in the transitional stage from high school to university. Although the freshman stage is considered as an adult, the presence of tutors/teachers in the library instruction session is required. There is a need to explicitly explain the importance of library instruction and libraries from the basic point of view. Library instruction and library concepts, as well as reasons one must learn library instruction, are explained thoroughly here. At this level, first-year students have a general idea of sources of information, how to browse information, identify hoax information, judge credibility, cite documents, conduct basic research, and recognize sources of information in the library and use them. In the information literacy instruction, students need to be given a particular lesson by the librarian to enhance their basic knowledge and information skills. The strategies offered are embracing library instruction by combining classroom teaching with a caring, open, friendly, and helpful environment. Embracing library instruction that puts emphasis on classroom teaching with teacher or tutor who delivers the material either in an offline or online class setting. This is relating to the behavioral approach. Teachers can promote a friendly environment, remember students' names to build bonding and trust, create positive environment for interaction, and always be open and helpful. Furthermore, embracing also combines hands-on activities and demonstration so that the student can build his/her individual information skill. These type of activities are considered as part of the humanism approach, which is to foster students' learning outcomes.

(b) Encouraging information literacy among sophomores

The second strategy is encouraging information literacy among sophomores, or second year student, whereby these students may have already started on independent and gradually self-regulated learning. Here, the library instruction strategy also changes, becoming "encouraging library instruction," which involves chunking information and one-on-one instruction. Second year students would have started on some level of independently research endeavor to understand the research process, and they need

appropriate information literacy for their desired topic. Thus, they need a supporting facilitator or instructor who can give them the relevant information personally. Therefore, the concept of chunking or providing pieces of theory instructions is more viable for this group. Chunking material will help the students' cognition to understand their research topics. Students learn bit by bit but in-depth, and then embark on critical thinking and synthesizing the information to gain further understanding. This learning approach is related to cognitivism. If a student does not understand the material, they can ask a librarian during the one-on-one instruction or seek personalised assistance. These learning strategies fall under scaffolding and the social constructivism approach. The materials provided at the sophomore level are writing argumentative research papers, library research, database search, and research project. With this approach, the student's learning time is flexible and he/she can set a timetable for learning only the specific information literacy skill needed, thus speeding up their learning curve.

Table 6: Proposed Teaching Strategies for Library Instruction

Student	Freshman	Sophomore	Graduate
Teaching Approaches	Combination of Behaviorism and humanism	Combination of Cognitivism and social constructivism	Combination of Cognitivism and Constructivism / Active learning
Teaching Strategies	***Embracing*** library instruction (combination of classroom or online teaching with a caring, open, friendly, and helpful technique)	***Encouraging*** library instruction (asynchronous chunking of information + one-on-one instruction)	***Leveraging*** library instruction (Critical research clinic + one-on-one instruction + online forum)
Teaching techniques	Visual animation Games; availability outside classroom; caring; critical discussion; teacher walking around; colorful, engaging classroom; interactive multimedia; demonstration	Chunking online video module; online materials; just-in-time instructions	Research-based assignments; student brings research project during clinic;
Topics	Develop an understanding (why), introduce information literacy concept, college research in general; plagiarism; database searches; web evaluation; citations; writing classes; corporate media	Writing argumentative research papers; library research; information retrieval; database searches; research project	Library research; finding dissertation; searching; publication process; thesaurus search database
Advantages	Improves the relationship between librarians and students; promotes caring relationships; attracts students; creates a positive environment	Flexible approach for different settings; focuses on individual research projects; enhances the relationship between student and librarian; increases engagement.	Encourages critical thinking and self-monitoring; models behavior for extended life learning; Engages students for a longer duration.
Challenges	Lack of motivation and interest; time constraints; takes much time; students who do not understand information literacy as a whole	Students do not watch the video; lack of interest	Miscommunication about clinic schedule; requires much time investment; shortage of librarians

(c) Leveraging library instruction for graduate students

The next library instruction strategy is "leveraging library instruction". Here, the target students are mainly graduate students. These students are more mature as they have completed their bachelor's degree and gained more knowledge and skills. Graduate

students tend to be independent learners, especially for research and publications. The leveraging strategy combines a research clinic, one-on-one instruction, and an online forum to develop and sharpen the graduate's ability to receive, organize and recall the information. These strategies are under the cognitivism approach because the learning focuses on prior knowledge to create new learning. The face-to-face starategy in leveraging involves more in-depth discussions relating to specific research topic. Graduate students can bring a project or topics studied in clinical research and share it with librarians, scholars, and other students through online forums provided by the library. Learning activity here may hone critical thinking and self-monitoring, modeling behavior for life-long learning, and engaging for a long duration. Graduate students are categorized as adults, and they learn independently in their own time. Therefore, they use online materials as media for self-directed learning under constructivism approach.

CONCLUSIONS

The literature has clearly revealed that teaching strategies for library instructions vary based on the librarian's approach. Learning in the context of library instruction, where librarians are more flexible and fun in delivering instructions, increases engagement, relationships, and enhances positive experiences between students and librarians. Learning method applied in the library instructions focuses mainly on student-centered learning. The librarian acts as a facilitator or instructor, such as in the use of the flip classroom and asynchronous learning. The flip classroom can increase student engagement and self-regulated learning. The literature has not yet determined which learning strategy the librarian is most effective in, however, the librarian could combine different learning strategies to cater to students at different levels of their study. Based on the results of the analysis, three strategies for library instruction in universities are recommended, namely embracing, encouraging and leveraging information literacy. Librarians could use the results of this study as a reference for implementing library instruction programs and determine an appropriate strategy for implementation and to achieve the desired learning outcome. The recommended strategies have not yet been tested; therefore, more research is needed to implement the suggested strategies.

ACKNOWLEDGEMENT

No grant from any public, commercial or non-profit funding agency was used in the conduct of this research.

AUTHOR DECLARATION

There are no conflict of interest involving either of the authors of this work.

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