

**ICONSPADU 2021****International Conference on Sustainable Practices, Development and Urbanisation****FROM DIGITAL DIVIDE TO EDUCATION SUSTAINABILITY: A  
SCOPING REVIEW**

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**Abstract**

Learning has evolved to being online, and it is now considered a norm for learners to learn synchronously and asynchronously. Previous studies have proved that this type of learning has proven to provide higher learning outcomes. However, that is if learners perceive it as positive. Unfortunately, learners from low-income families have had difficulties coping with being online. Hence, this scoping review aims to distinguish the challenges learners from low-income families face when studying online. By understanding the challenges of learners from low-income families, educators can create an effective learning strategy that helps cater to these learners' needs. Guided by the Systematic reviews and Meta-Analysis extension for Scoping Reviews (PRISMA-ScR), this study has explored the Scopus and Web of Science (WoS) databases regarding the challenges learners from low-income families faced when studying online. The results report the temporal, geographical relationship, setting, design type, purpose, types of challenges, and summarising results of the past literature. Six themes of challenges were found from the results, which are 1) connectivity, 2) lack of appropriate devices, 3) unfitting learning environment, 4) lacking in digital skill, 5) lack of self-discipline, and lastly having 6) socio-economic issues.

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## 1. Introduction

Online learning has surged through the roof in the past years due to the pandemic. Because of that, many learners started their studies online and found it a norm compared to physical in-class learning (Becker, 2017). According to past literature, learning online has been termed differently, and they all have a somewhat similar definition where it could be synchronous, asynchronous or a mix of both. Singh and Thurman (2019) explain that learning synchronously occurs when all learners are involved with the teacher online. The teacher may be presenting the lesson, and learners are watching live via their devices. Asynchronous, however, is when the lessons are offline where learners are free to explore themselves as long as they are within the lesson topic. Muller et al. (2018) say that learners are in charge of their learning due to the lack of physical communication and the task of discovering the meaning of the lessons by themselves. Many studies have been found that learning online brings positive learning outcomes (Du Toit & Verhoef, 2018; Laudari & Maher, 2019). However, this is only possible if learners positively perceive it (Alzahrani & Seth, 2021).

## 2. Problem statement

Learners coming from low-income families have had difficulties coping with being online, which also affects how they view it. Department of Statistics of Malaysia (2019) identified three different income groups. Having an income of less than 4,849 means that the family falls in the Bottom 40% (B40) category. Table 1 below shows the median income in Malaysia Ringgit of each income group.

Unfortunately, these learners suffer from digital divides that hinder their learning process. Badiuzzaman et al. (2021) explain that the digital divide is when a society does not have the same luxury of technological distribution in terms of usage and access. When learners are not equipped with the necessary tools to help them learn, they are easily demotivated. They see no reason to continue their studies (Singar & Zainuddin, 2017) which causes them to drop out of school and search for jobs that could help support them and their families (Linne, 2014).

**Table 1.** The median income in Malaysia Ringgit of each income group

Income Classification by Household			
Household group		Median Income (RM)	Income Range (RM)
B40	B1	1,929	Less than 2,500
	B2	2,786	2,500 – 3,169
	B3	3,556	3,170 – 3,969
	B4	4,387	3,970 – 4,849
M40	M1	5,336	4,850 – 5,879
	M2	6,471	5,880 – 7,099
	M3	7,828	7,110 – 8,699
	M4	9,695	8,700 – 10,959
T20	T1	12,586	10,960 – 15,039
	T2	19,781	15,040 or more

By understanding the challenges of learners from low-income families, educators can create an effective learning strategy that helps cater to these learners' needs. Hence, this scoping review may be a stepping stone to the challenges learners from low-income families face when studying online.

### 3. Research Methods

This study was guided by Arksey and O'Malley's (2005) five-step methodological framework; Preferred Reporting Items for Systematic reviews and Meta-Analysis extension for Scoping Reviews (PRISMA-ScR).

#### 3.1. Identifying research question

The first step is to identify the research question. Since most existing literature already explains the advantages and effectiveness of learning online, a portion of those literature covers the challenges. However, only a handful of existing studies focus on the low-income group of the world. As a guide, this scoping review study will be looking into the research question, 'what existing literature has to provide about challenges of learners from the low-income group while learning online?'. Table 2 shows the PCC (Population/Concept/Context) framework of the underlying research question formed from the research objective.

**Table 2.** Underlying research question formed from the research objective using PCC

Research questions	Specific objectives
1. What is the temporal and geographical relationship in which studies on challenges of learners from low-income families have been developed?	1. To explore the temporal and geographical relationship in which studies on challenges from learners from low-income families have been developed.
2. What are the settings and design types of the studies related to challenges faced by learners from low-income families?	2. To identify the setting and the primary type of design used in studies on challenges from learners from low-income families
3. What are the purposes of the studies regarding challenges of learners from low-income families	3. To identify the purpose most frequently investigated in the studies about challenges from learners from low-income families
4. What are the challenges been researched by past studies?	4. To identify the challenges been research by past studies
5. What are the results of studies regarding the challenges of learners from low-income families?	5. To summarise the results of the studies regarding challenges of learners from low-income families

#### 3.2. Identifying relevant studies

The second step is to identify the relevant studies. This study looked into two databases which were WoS and Scopus. The search strings utilised were generally used to have the most results from the relevant studies. Table 3 shows the search strings involved.

**Table 3.** Search strings and search directory involved

Search directory	Search string
Scopus	TITLE-ABS-KEY (("challenge" OR "barrier") AND ("learn" OR "student") AND ("digital" OR "interactive") AND ("smart" OR "online" OR "electronic learn" OR "distance learn" OR "open distance" OR "techno integrated" OR "blended learn" OR "computer mediated" OR "computer assisted" OR "ICT" OR "informat technology") AND ("poor socioeconomic" OR "poor" OR "needy" OR "low" OR "underprivileged"))
Wos	((((TS=(challenge OR barrier OR obstacle)) AND TS=(learner OR student)) AND TS=(elearn OR digital OR hybrid learn OR blend learn OR online learn OR smart)) AND TS=(poor OR needy OR underprivilege OR poverty))

### 3.3. Study selection

The third step is study selection. This it is specified the inclusion and exclusion criterion of the search. After brainstorming and discussing with the research team members, table 4 presents the results of the discussed criterion.

**Table 4.** The inclusion and exclusion criterion

Inclusion criterion	Exclusion criterion
1. English language	1. Non-English language
0. Focus on online learning challenges	2. Not related to online learning challenges
0. Focus on low-income groups	3. Not related to low-income group
0. Focus on learners in schools/higher education	4. Not related to learners in school/higher education
0. Focus on online learning	5. System development of online learning
0. Full text published	6. Full text not attained

### 3.4. Data charting

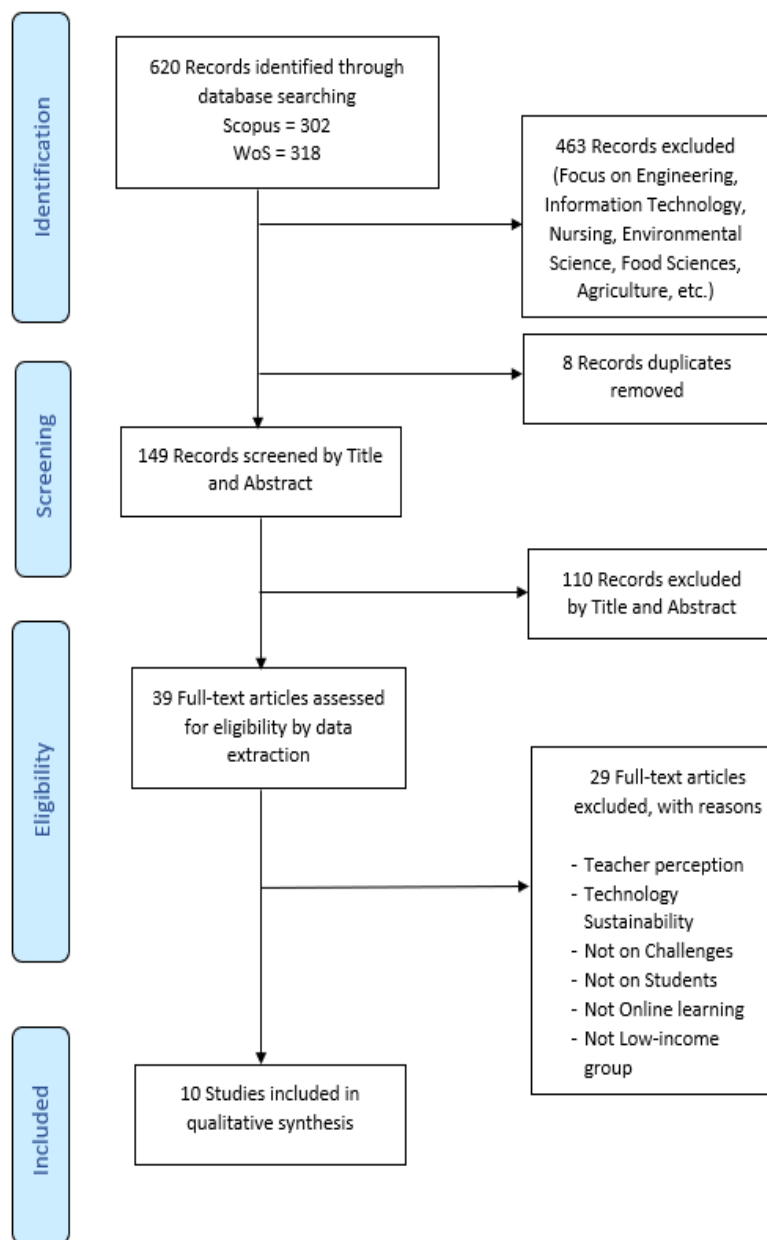
The fourth step is charting the data. After discussing which articles should be included in the data with the research members, a chart is formed by the first author and then reviewed by the senior author. The following study aspects developed the chart: author, year of publication, article title, country of origin, setting, design type, participant, the purpose of study, challenges found, and the final results.

### 3.5. Collate, summarise, and report results

The last step is to collate, summarise, and report the results. After the first author presents the chart, the research members are called again to review and revise the data and provide further recommendations. This is so the data presented stays within the previously discussed criterion and research objective.

## 4. Findings

Figure 1 shows the flow diagram of scoping review. A total of 620 studies were identified through the databases. 302 studies were found from the Scopus database, and 318 studies were from WoS. 463 studies were excluded due to not being within the criterion, and 157 studies were left for the title and abstract screening. After removing eight duplicates, 149 studies went through full-text assessments for eligibility screening. From that, 110 studies were removed, and 39 studies were left. 29 studies were then excluded due to not focusing on online learning challenges, and finally, ten studies were left for qualitative synthesis. Table 5 shows the aspect that was included in the study as well as the results of the 10 studies included for the qualitative synthesis.



**Figure 1.** Flow diagram of scoping review

**Table 5.** Aspect of included studies

No.	Reference	Title	Country of origin	Setting	Design type	Participants	Purpose of study	Challenges found	Results of study
1	Shrestha et al. (2021)	Preparations for and practices of online education during the Covid-19 pandemic: A study of Bangladesh and Nepal	Bangladesh & Nepal	Higher education	<ul style="list-style-type: none"> <li>• Qualitative</li> <li>• Quantitative</li> </ul>	<ul style="list-style-type: none"> <li>• 147 students and 76 teachers</li> <li>• 17 participants for interview</li> </ul>	To investigate teachers' and students from Bangladesh and Nepal experiences of online education during the pandemic	<ul style="list-style-type: none"> <li>• Poor network</li> <li>• Lack digital skills</li> <li>• Lack technological support</li> </ul>	This study reported that several digital tools (Facebook, Zoom, Google Meet, email, Messenger group, and WhatsApp) were widely used among the teachers and students. It is the best way to adapt to their situation. Students are found to have sufficient devices for online learning; however, due to the lack of access to quality internet connectivity, they cannot fully utilize what they have.
2	Badiuzzaman et al. (2021)	The latent digital divide and its drivers in e-learning among Bangladeshi students during the COVID-19 pandemic	Bangladesh	Higher education	<ul style="list-style-type: none"> <li>• Quantitative (Survey and open question)</li> </ul>	<ul style="list-style-type: none"> <li>• 123 students</li> </ul>	To explore the underlying issues of the digital divide among Bangladeshi students	<ul style="list-style-type: none"> <li>• High data prices</li> <li>• Poor network infrastructure</li> </ul>	Results indicate that most families are from low-income families, mothers have graduated from high school, and fathers have elementary-level education. Students experience relatively poor internet connection and are mostly lack digital
3	Gocotano et al. (2021)	Higher education students' challenges on flexible online learning implementation in the rural areas: A Philippine case	Philippines	Higher education	<ul style="list-style-type: none"> <li>• Quantitative</li> <li>• Qualitative</li> </ul>	<ul style="list-style-type: none"> <li>• 639 university students</li> </ul>	To explore the students' challenges on flexible online learning implementation of the university in the rural area based on their background and experience.	<ul style="list-style-type: none"> <li>• Unavailable network</li> <li>• Economic instability</li> <li>• Lack digital devices</li> <li>• Distractive learning environment</li> <li>• Expensive internet data</li> <li>• Health-related problems</li> <li>• Lack of resources</li> </ul>	

4	Bashitialshaaer et al. (2021)	Obstacles to applying electronic exams amidst the COVID-19 pandemic: An exploratory study in the Palestinian universities in Gaza	Palestine	Higher education	<ul style="list-style-type: none"> <li>• Questionnaire (survey and open question)</li> </ul>	<ul style="list-style-type: none"> <li>• 152 university teachers and 55 students</li> </ul>	To identify and understand the obstacles and barriers in applying electronic exams successfully in distance education.	<ul style="list-style-type: none"> <li>• Lack of digital literacy skills</li> <li>• Loss of motivation</li> </ul>	literacy.
5	Landa et al. (2021)	Education in emergencies: Lessons from COVID-19 in South Africa	South Africa	Higher education	<ul style="list-style-type: none"> <li>• Qualitative</li> </ul>	<ul style="list-style-type: none"> <li>• 15 educators and 30 students</li> </ul>	To document the intervention strategies developed by two universities located in remote parts of Eastern Cape Province to deliver education during the COVID-19 restrictions. To examine the challenges experienced by the two institutions' largely rural student population.	<ul style="list-style-type: none"> <li>• Lack device</li> <li>• Connectivity</li> <li>• Expensive cellular data</li> <li>• Lack of digital literacy skill</li> <li>• Self- discipline</li> <li>• Time management</li> <li>• Workplace</li> </ul>	Students from poor rural communities have difficulties in accessing the internet, and the education outcome broadly differ from socio-economical background
6	Hagedorn et al. (2021)	"My Entire World Stopped": College Students' Psychosocial and Academic Frustrations during the	North America	Higher education	<ul style="list-style-type: none"> <li>• Qualitative</li> </ul>	<ul style="list-style-type: none"> <li>• 2643 undergraduate and graduate students</li> </ul>	To evaluate college students' academic and psychosocial frustrations during the COVID-19 pandemic.	<ul style="list-style-type: none"> <li>• Connectivity</li> <li>• Speed of internet</li> <li>• Equipment issues</li> <li>• Socioeconomic</li> <li>• Insufficient devices</li> </ul>	Students find using technology for classwork and research frustrating. It was suggested that with the results, faculties should plan

		COVID-19 Pandemic							
7	Ukwoma et al. (2016)	Digital literacy skills possessed by students of UNN, implications for effective learning and performance: A study of the MTN Universities Connect Library	Nigeria	Higher education	<ul style="list-style-type: none"> <li>• Quantitative</li> </ul>	<ul style="list-style-type: none"> <li>• 184 students</li> </ul>	The purpose of this study is to identify the digital literacy skills possessed by the students of the University of Nigeria, Nsukka (UNN), and the extent to which they use these digital literacy skills in their academic works.	<ul style="list-style-type: none"> <li>• Electricity failure</li> <li>• Low internet bandwidth</li> <li>• ICT facilities</li> <li>• Lack of development of digital literacy programme and standard</li> </ul>	better online courses to lessen frustration and drop out of students.  Despite the challenges, students still possess sufficient digital literacy, which helps them achieve academic performance.
8	Safford & Stinton (2016)	Barriers to blended digital distance vocational learning for non-traditional students	N/A	Higher education	<ul style="list-style-type: none"> <li>• Quantitative</li> <li>• Qualitative (Interview and video diary)</li> </ul>	<ul style="list-style-type: none"> <li>• 163 students</li> <li>• Six interviewees</li> </ul>	Identifies and examines the challenges of blending digital distance and vocational learning for non-traditional and low-socio-economic status students new to university education.	<ul style="list-style-type: none"> <li>• Where and when to go online</li> <li>• Finding support for digital study</li> <li>• Navigating virtual learning environments and knowing what is relevant</li> <li>• Variable or no technologies in the workplace</li> <li>• Making connections between workplace technologies and ICT for study</li> <li>• Storing and organising digital information.</li> </ul>	Besides students lacking digital literacy, other challenges outside of students' control still exist in the results. It was suggested by the study to have a different teaching strategy for the students that could cater to their struggles



9	Liyanagunawardena et al. (2014)	Developing government policies for distance education: Lessons learnt from two Sri Lankan case studies	Sri Lanka	Higher education	<ul style="list-style-type: none"> <li>• Ethnographic research approach</li> </ul>	<ul style="list-style-type: none"> <li>• 129 questionnaires</li> <li>• 33 individual interviews,</li> <li>• 2group interviews</li> </ul>	To identify several barriers that impede successful participation for most Sri Lankans wanting to study at the tertiary level.	<ul style="list-style-type: none"> <li>• Lack of infrastructure/resources</li> <li>• Low English language proficiency</li> <li>• Weak digital literacy</li> <li>• Poor quality of materials</li> <li>• Insufficient provision of student support.</li> </ul>	After analysing the existing challenges, the study suggested a list of policy options to avoid past mistakes
10	Linne (2014)	Adolescents from low-income sectors: The challenge of studying in a time of digital environments	Argentina	Secondary school	<ul style="list-style-type: none"> <li>• Qualitative</li> </ul>	<ul style="list-style-type: none"> <li>• 26 respondents</li> </ul>	To investigate practices and perceptions regarding the study of adolescents from low-income sectors in the City of Buenos Aires.	<ul style="list-style-type: none"> <li>• The unreliable information</li> <li>• Stay focus</li> <li>• Socio-economical</li> <li>• Internet access</li> <li>• Lack of device</li> </ul>	The study found that adolescents in the sample experienced more difficulties than others. They experience more challenges in searching for reliable learning materials despite having similar communication and recreational skills.

- i. RQ1: How are the studies focused on challenges faced by low-income learners distributed?

The works of literature were distributed throughout the years from 2014 to 2021. However, there was no found publication in 2015, 2017, 2018, 2019, and 2020. A total of n=2 studies were found in 2014 and another n=2 more in 2016. The remaining n=6 were found in 2021. In terms of country distribution, most of the studies are from the Asian continent, with n=2 from Bangladesh and n=1 each from the Philippines, Palestine, and Sri Lanka. A total of n=2 were found from Africa, and the others were found from Argentina (n=1) and North America (n=1). There was n=1 study found that did not specify the country of origin.

- ii. RQ2: What are the settings and design types of the studies related to challenges faced by learners from low-income families?

Most of the literature settings (n=9) were based on higher education except for n=1, based on secondary school. As for design type, n=3 studies were found using the qualitative method and n=1 using the quantitative approach. A total of n=2 applied the quantitative methodology with a mix of questionnaires and open-ended questions in their data collection. Interestingly, another n=3 studies were found using a combination of the quantitative and qualitative methods. Finally, the last n=1 uses the ethnographic research approach.

- iii. RQ3: What are the purposes of the studies regarding challenges from learners from low-income families?

As for the study purpose, the most common reason for these studies to be conducted is to investigate the challenges found by learners in online learning. N=6 studies reported investigating the challenges, issues, barriers, and obstacles of learners from low-income families while learning online. N=3 were found to study learners' perceptions, experiences, and frustration. Lastly, n=1 to identify the digital skill of learners while learning online and how they use them.

- iv. RQ4: What are the challenges been researched by past research?

With most of the studies' purpose being to investigate the challenges of learners from low-income families while learning online, many challenges were reported from their findings. However, the challenges have been categorised into several themes to summa-rise the results. The first theme is in terms of connectivity. N=8 studies were found to have internet access problems and low bandwidth for online learning. The second theme is devices. N=7 studies find that learners have issues with the lack of appropriate devices for their education. At the same time, n=7 studies have been found to have problems with the learning environment. Learners either have inappropriate learning settings or have a distractive environment that hinders their learning session. Next, n=5 studies fall into the lack of digital skill theme. This is where sufficient digital literacy to operate the learning tools that could help them in their studies. In the theme of discipline, n=4 studies were found to have learners lacking self-discipline, time management, and motivation in their online learning experience. Since this scoping review looks into

learners from low-income families, socio-economical issues are a theme. N=6 were found to have insufficient financial support for the learner's studies.

- v. RQ5: What are the results of studies regarding challenges from learners from low-income families?

To summarise the results found from the ten pieces of literature, most of the studies (n=7) report the challenges learners face from low-income families. These studies reinstate the difficulties the learners face ranging from connectivity, digital literacy, socio-economical situation, and other challenges. N=2 of the studies provided suggestions for improving their concerns by suggesting a list of policies and a new strategy that could cater to what learners lack. Lastly, n=1 of the study reported having different types of digital tools (Facebook, Zoom, Google Meet, email, Messenger group, and WhatsApp) used by teachers to adapt to the challenges faced by their learners.

## **5. Discussion**

As learning has evolved, the pandemic has given the education sector a final push to bring learning to a higher level. Unfortunately, learners from low-income families do not experience the same privilege as those from higher family incomes. The results discussed previously show that most of the literature comes from the Asian context. The reported countries could still be considered as underdevelopment countries. These learners suffer from several challenges. Namely, 1) connectivity, 2) lack of appropriate devices, 3) unfitting learning environment, 4) lacking in digital skill, 5) lack of self-discipline, and lastly having 6) socio-economic issues. However, it is impressive to see how they overcome the challenges in their ways for learners to not give up on learning together.

### **5.1. Connectivity**

As shown previously, connectivity is one of the significant issues faced by learners from low-income families. It is either due to their inability to access the internet or their infrastructure where internet connection is close to none. It was even reported that learners would need to travel to another destination to check their emails (Landa et al., 2021). Significant issues like these would need to be addressed to produce higher learning outcomes. The lack of internet connection proves an obstacle for learners and hinders their digital literacy. Without it, learners would be excluded from the global information network (Ukwoma et al., 2016).

### **5.2. Lack of appropriate devices**

Besides connectivity, learners face problems with having adequate devices for their online studies. This serves as a disadvantage to learners as they experience a digital divide and cannot utilize the available technology of their time (Linne, 2014). Unfortunately, possessing adequate digital devices is a challenge in itself (Bashitialshaer et al., 2021). Most families only own one digital device for learners and often need to share (Hagedorn et al., 2021). Besides that, learners probably have outdated appliances and are only compatible with lower technological software (Gocotano et al., 2021).

### **5.3. Unfitting learning environment**

Usually, when learners are in a physical class, they would most probably be more focused on the lesson since everyone around them are on the same page and learning collaboratively (Safford & Stinton, 2016). Home is where learners relax or will need to focus on another task. This would make them easily distracted by their lessons as they have an inefficient learning environment at home (Gocotano et al., 2021). Learners may come from big families and may also be distracted by their family members at home. One of the ways that could be suggested is to place learners in a separate room for their study time. However, it will still prove to be a challenge since their families' socio-economic stance probably does not have room for themselves.

### **5.4. Lacking in digital skill**

Learners need to have adequate digital literacy skills to navigate the internet to find relevant information and know what to do when they fall into unfamiliar territories (Safford & Stinton, 2016). However, with the lack of internet connection (Landa et al., 2021) and appropriate technological devices (Linne, 2014), they are most likely to have the least amount of practice to possess their digital skills (Ukwoma et al., 2016).

### **5.5. Lack of self-discipline**

According to the results discussed earlier, n=4 studies were found to have learners having lack self-discipline. This is in terms of time management (Landa et al., 2021), staying focused (Linne, 2014) as well as having motivation (Gocotano et al., 2021) in their online learning experience. As learners cannot contact their peers, they cannot learn collaboratively, losing focus quickly. Hagedorn et al. (2021) also explain that having insufficient infrastructure for learning online brings out negative emotions that hinder motivation and learning outcomes.

### **5.6. Socio-economic issues**

Socio-economic issues are one of the most prominent issues within these studies. N=3 studies reported high cellular prices, hindering their education quality. These learners cannot study online since they cannot afford to connect to the internet. As learners come from low-income families, they would have to struggle more to access quality internet to maintain their educational well-being to keep up with the sudden transition to online learning (Hagedorn et al., 2021). To overcome the challenges, the study by Shrestha et al. (2021) reported that teachers use several types of digital tools that use lower technological needs to help adapt to their difficulties. This is considered a smart move since students can still learn physically in class and use socially known chatting apps to replace the widely known learning management system. With this, learners can learn and have their assignments done independently.

## 6. Conclusion

This scoping review has reported the temporal, geographical relationship, setting, design type, purpose, types of challenges, and summarising results of past literature regarding the challenges learners from low-income families faced when studying online. It has also reported the six themes of challenges found from the results, which are 1) connectivity, 2) lack of appropriate devices, 3) unfitting learning environment, 4) lacking in digital skill, 5) lack of self-discipline, and lastly having 6) socio-economic issues. Through this scoping review, it has been determined that only a handful of literature covers the objective. This proves that there is still a lack of research in this area, and it is in the hope that this scoping review will be a stepping stone for future research.

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