Challenges in the online component of blended learning: A systematic review

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ABSTRACT

Blended learning is widely regarded as an approach that combines the benefits afforded by face-to-face and online learning components. However, this approach of combining online with face-to-face instructional components have raised concerns over the years. Several studies have highlighted the overall challenges of blended learning mode of instruction as a whole, but there has been no clear understanding of the challenges that exist in the online component of blended learning. Thus, a systematic review of literature was conducted with the aim of identifying the challenges in the online component of blended learning from students, teachers and educational institutions perspectives. Self-regulation challenges and challenges in using learning technology are the key challenges that students face. Teachers challenges are mainly on the use of technology for teaching. Challenges in the provision of suitable instructional technology; and effective training support to teachers are the main challenges faced by educational institutions. This review highlights the need for further investigations to address students, teachers and educational institutions challenges in blended learning. In addition, we proposed some recommendations for future research.

1. Introduction

The inclusion of technology into face-to-face teaching has attracted huge attention and has provided various research avenues over the years. Today, blended learning is considered the most effective and most popular mode of instruction adopted by educational institutions due to its perceived effectiveness in providing flexible, timely and continuous learning. Blended learning involves the combination of face-to-face and technology-mediated instruction (Wendy W. Porter, Graham, Spring, & Welch, 2014). (D. R Garrison & Kanuka, 2004) defines blended learning as "a thoughtful integration of classroom face-to-face learning experiences with online experiences". Since early 2000, educational institutions have adopted different forms of mixing online with traditional face-to-face instructions; commonly referred to as blended, hybrid, and flipped or inverted - which are categorized based on the sequence of integrating face-to-face and online sessions.

This idea of blending instructional materials with online interventions has proven to be an upgrade to both face-to-face traditional mode and the fully online mode of instructions. Because, if done well, the approach combines the benefits afforded by both face-to-face and online learning mode of instructions (Broadbent, 2017). For example (Jusoff & Khodabandelou, 2009) shows that blended learning reduces online transactional distance and increases the interaction between teachers and their students; blended learning offers flexibility, pedagogical richness and increase in cost effectiveness (R. Graham, 2006, pp. 3–21); blended learning ensures value

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interaction and learning engagement (Dziuban, Moskal, & Hartman, 2005, pp. 88–89); and it is considered valuable for different sorts of learners (Heinze & Procter, 2004).

While the merits and benefits of blended learning approach in optimizing teaching and learning is apparent from countless influential studies, and regarded by many scholars as 'the new normal' (Dziuban, Graham, Moskal, Norberg, & Sicilia, 2018) in education due to its high rate of adoption, popularity and perceived benefits; the inclusion of technology into instruction thereby creating the online component has brought some level of unease to students, teachers and educational institutions. For example, it becomes necessary for students to have self-regulation skills and technological competence since they are required to manage and carry out their studies independent of their instructor, at their own pace, and also using online technology out of their face-to-face sessions. Secondly, it becomes necessary for teachers to be technologically competent, to effectively use and manage technology for teaching, and also to create and upload learning materials to students (e.g. creating quality online videos). Thirdly, it is the responsibility of educational institutions in providing the necessary training and technological support to both teachers and students in order to ensure the effective utilization of the available technology, and in addition, to efficiently utilize the online component.

Several studies have reported the problems that students e.g. (Broadbent, 2017; Prasad, Maag, Redestowicz, & Hoe, 2018), teachers e.g. (Cuesta Medina, 2018; Ocak, 2011) and educational institutions e.g. (Cuesta Medina, 2018) encounter with the online component of blended learning. However, these studies are limited in providing an overall and clearer picture of the challenges in managing teaching and studying out of the face-to-face class sessions. Some studies are also characterized by reporting from a single type of blended learning. For example, the study of (G. Akçayır & Akçayır, 2018) that reported the advantages and challenges of flipped classroom is only limited to flipped classroom type of blended learning, and it specifically reported the technological challenges found in flipped classrooms. Similarly, the study of (Brown, 2016) reported the challenges from teachers perspective only. Results of the study found teachers' technological anxiety, complexity and illiteracy, students' technological illiteracy as the challenges teachers encounter in using online technology for instruction. Another related study to that of (Brown, 2016) is the study of (Ocak, 2011) which revealed the reasons for teachers not teaching blended courses.

Additionally, some of the recent and most pronounced studies in blended learning have focused on the design challenges as a whole, but not particularly focusing on the online component. For example, the study of (Boelens, De Wever, & Voet, 2017b) identifies 'incorporating flexibility'; 'facilitating interaction'; 'facilitating students' learning processes'; and 'fostering an effective learning climate' as the 'four key challenges to the design of the blend' in a blended learning environment. Similarly, the series of influential studies of 'Graham' and his team (C. R. Graham, Woodfield, & Harrison, 2013; Halverson, Graham, Spring, Drysdale, & Henrie, 2014; Wendy W Porter & Graham, 2016; Wendy W Porter, Graham, Bodily, & Sandberg, 2016; Wendy W. Porter et al., 2014) that filled a huge gap in blended learning literature by providing the framework, directions and guidelines for educational institutions in implementing an effective blended learning instruction, have also considered examining blended learning (face-to-face and online components) as a whole in offering such contributions.

Evidently, blended learning literature is short in providing a detailed picture of the challenges in the online component of blended learning. As blended learning constitutes of two instructional components (face-to-face and online components) amalgamated as one, literary, by disregarding the face-to-face component, students and teachers are automatically relocated to the online (out of face-to-face sessions) component, and are therefore expected to proper self-regulate and manage their tasks using technology, and at their own pace. Therefore, we aim to explain the challenges in the online component of blended learning from students, teachers and educational institutions perspectives. We also intend to identify the areas in which knowledge is as yet weak and inconclusive, thereby setting new directions for future research. Keeping in mind that, for the purpose of this study, we consider students, teachers and educational institutions as the three primary stakeholders or entities in blended learning. Because educational institutions that employ blended learning mode of instruction are responsible for providing the platform and support for the online component, we aim to describe the challenges that institutions face with regard to their online component support e.g. technological costs.

This study is structured into four main sections. The next section is the methodology section which describes the research questions of this study, the literature search process and the study selection process. The third section is the results section which presents the findings, categorization and analysis of results. Finally, the discussion, limitations and conclusion sections discusses the findings, implications, research gaps and offers key recommendations for future research.

2. Methodology

This work was driven by investigating three research questions as: RQ1 - 'What are the challenges that students face in the online component of blended learning?', RQ2 - 'What are the challenges that teachers face in the online component of blended learning?' and RQ3 - 'What are the challenges that educational institutions face in the online component of blended learning?'. In order to fully understand these challenges, we explored the recent literature as the primary source of answering these research questions.

2.1. Literature search process

First, we queried the Web of Science (WoS) electronic database in early December 2018. We chose the WoS database as it is the gateway for all the Social Science Citation Indexed (SSCI) and Science Citation Indexed (SCI) journals. We formulated a search string based on our understanding and knowledge in blended learning domain and also, by referring to related blended learning search strings used in other studies such as (Boelens, De Wever, & Voet, 2017a). We queried the Web of Science database for the second time on the 1st of January 2019, enabling us to include all the publications in the year 2018. The search string *(blend* learning OR hybrid learning OR flipped learning OR blend* course OR hybrid course OR flipped course OR flipped classroom*)* was keyed into the advanced

search option of Web of Science database. We then specified the range of years from 2014 to 2018, and the search was further refined by specifying (Social Science Citation Index SSCI); and research area (Educational Education Research, educational psychology research and educational scientific discipline) by adopting a similar method of refinement from (G. Akçayır & Akçayır, 2018). A total of 591 results were finally retrieved. Furthermore, we added three additional studies: (Brown, 2016), (G. Akçayır & Akçayır, 2018) and (Boelens et al., 2017a) found from other sources (Google Scholar and Science Direct) in ensuring that all the relevant studies for answering our research questions were gathered. Apparently, as blended learning research area has been very active over the years and has yielded large quantity of publications due to its popularity and termed as the most recognized mode of instruction globally, we therefore focused our research by considering studies from 2014 to 2018. Secondly, keeping in mind that technology evolves and changes rapidly, and this study intends to reveal the current challenges in the online component of blended learning; this has made us to only consider the most recent literature in order to avoid the risk of identifying irrelevant online or technological challenges that are obsolete. Nevertheless, we have also referenced and cited numerous other influential studies related to our study to support and provide basis and evidences in answering our research questions.

2.2. Eligibility criteria

Inclusion and exclusion criteria were set to further refine the 591 results obtained. We refined our results by only considering (a) articles that define blended learning as a combination of face-to-face and online interventions; (b) blended learning must be the central topic of the article, or in synergy with a related instructional method e.g. fully online learning; (c) empirical studies; (d) articles must mainly investigate educational aspects of blended learning in educational settings. Exclusion criteria: (a) articles that focus solely on face-to-face aspects of blended learning; (b) book chapter reviews; (c) non-English articles; and (d) articles in which the full text was not available.

After considering the articles based on inclusion and exclusion criteria, 384 studies remained. A database with the 384 articles containing titles, abstracts and full texts was created in EndNote reference management software. The authors carefully shared the articles and read through the full text of each article. As a result, challenges/problems exclusively within the online component of blended learning were found in 30 studies. We only considered the reported challenges from the results and discussions, and we disregarded any challenge from the literature review of an article. Fig. 1 below provides an overview of our search protocol based on the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) recommendation statement (Moher, Liberati, Tetzlaff, & Altman, 2009)

3. Results

This section answers the research questions of this study by reporting and discussing the challenges that students, teachers and educational institutions face in the online component of blended learning. Furthermore, the section analyses the possible causes and/or origins of these identified challenges, the link or relationship with other challenges and the various approaches employed in
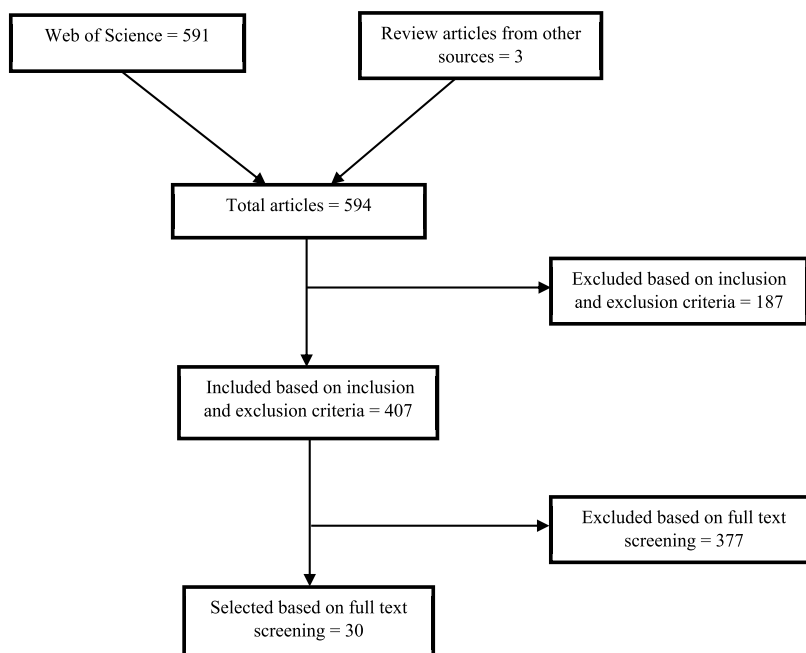
Fig. 1. An overview of the search protocol based on the PRISMA recommendation statement.

resolving these identified challenges.

3.1. Characterization of the results

3.1.1. Inductive categorization

The obtained results were grouped into three categories to answer the research questions (RQ1 – students' challenges, RQ2 – teachers' challenges and RQ3 – educational institutions challenges). Five challenge themes emerged from RQ1, four themes from RQ2 and three themes from RQ3. Furthermore, we developed an inductive code by examining each of the inductive categorical themes of the results.

3.1.2. General characteristics of RQ1

From the obtained results of the students' challenges group, five inductive categories emerged (self-regulation challenges, technological literacy and competency challenges, students' isolation challenges, technological sufficiency challenges and technological complexity challenges). The results were further refined to ensure that each identified challenge is a single and non-ambiguous challenge. Although, some of the studies reported more than one challenge, and some of the challenges reported are suitable to more than one inductive category. The challenges that were identified to best fit into more than one inductive category were included into each of those inductive categories.

We provided a name that best fits each categorical theme, and we also allotted 'n' to be the number of challenges in a category. First, 'self-regulation challenges' (SRC; n = 18) involve the set of related students' behavior that deter them to self-regulate their feelings, thoughts and actions which are planned for achieving their learning goals. The second category was termed – 'technological literacy and competency challenges' (TLCC; n = 13), which involve the set of challenges related to students' proficiency and competency in the effective use of technology for studying. The third category was termed – 'students isolation challenges' (SIC; n = 4) which involve the set of related emotional discomfort that students suffer when studying out of their face-to-face classes, mainly due to loneliness and seclusion from their peers. 'Technological sufficiency challenges' (TSC; n = 5) involve the set of related challenges that students face in gaining access to sufficient online technologies and services for studying. 'Technological complexity challenges' (TCC; n = 3) involve the set of related challenges that students face with complex or over-sufficient technologies for their studies.

3.1.3. General characteristics of RQ2

From the obtained results, four inductive categorical themes emerged (teachers' technological literacy and competency challenges, technological operation challenges, teachers' belief challenges and other challenges). 'Teachers technological literacy and competency challenges' (TTLCC; n = 11) comprise of the related challenges that involves teachers' incompetency and illiteracy in using technology for teaching; 'technological operation challenges' (TOC; n = 7) involve the related challenges that teachers face in working and operating technology for teaching. 'Online video challenges' (OVC; n = 4) involve the challenges that teachers face in creating, uploading and disbursing quality video contents to their students. Finally, 'teachers' belief challenges' (TBC; n = 3) comprise of the negative beliefs and perceptions that teachers have in using technology for teaching.

However, we noticed that all of the four inductive categories of teachers challenges mentioned are related and can possibly be categorized as a single category. Nevertheless, we chose to be more specific by providing a fine grain refinement to the challenges.

3.1.4. General characteristics of RQ3

From educational institutions, the challenges mainly entail provision of instructional technologies and effective training support to teachers. Three inductive categorical themes emerged: Technological provision challenges, teachers training challenges and others). Technological provision challenges (TPC; n = 6) involve the set of related challenges that educational institutions face in providing the suitable technological support and services needed for blended learning instruction. Teachers training challenges (TTC; n = 1) involve the set of related challenges that educational institutions face in providing effective training to teachers in using technology for teaching. Other challenges (OTC; n = 1) consist of challenges that are neither related to technological provision nor teachers training.

3.2. RQ1: what are the challenges that students face in the online component of blended learning?

3.2.1. Self-regulation challenges

Students are basically required to self-regulate their learning activities out of their face-to-face sessions. Though, due to flexibility and autonomy offered in blended learning, students usually organize their learning activities by devoting a relatively small portion of their time to learning tasks (e.g. revision of learning materials) and assignments right before the due date/time. In this way, learners use most of the time intended for studying in the online environment for other activities.

From Table 1, a large portion of the identified challenges that students face out of the face-to-face component are self-regulation challenges (n = 18). Although self-regulation is not as crucial to blended students as it is to fully online students, but it appears to be imperative to the success of students in a blended learning mode of instruction. Freedom of learning at one's pace and flexibility that online modalities offer have always endangered or rendered students into poor self-regulation behavior. The results in Table 1 highlights students' lack of self-regulation skills' to organize and manage their studies independent of their instructor(s) as a key challenge faced by students. The studies of (Chuang, Weng, & Chen, 2018; Lightner & Lightner-Laws, 2016; Çakiroglu & Öztürk, 2017) offered a more general description of self-regulation in describing 'self-regulation' as a challenge, while other studies were

Table 1
Students challenges in the online component of blended learning.

Inductive categories (codes)	Sub-categories	Articles
Self-regulation Challenges (SRC)	Procrastination Online help-seeking challenge Lack of self-regulation skills Limited preparation before class Poor time management skills Improper utilization of online peer learning strategies	(AlJarrah et al., 2018), (Broadbent, 2017), (Maycock et al., 2018), (Chuang et al., 2018), (J. C. Y. Sun et al., 2017) (Broadbent, 2017), (Safford & Stinton, 2016), (G. Akçayır & Akçayır, 2018) (J. C. Y. Sun et al., 2017), (Lightner & Lightner-Laws, 2016), (Chuang et al., 2018), (Çakiroglu & Öztürk, 2017) (Long, Cummins, & Waugh, 2017), (Xiao, Thor, Zheng, Baek, & Kim, 2018), (G. Akçayır & Akçayır, 2018) (Broadbent, 2017), (Zacharis, 2015) (Broadbent, 2017)
Technological Literacy and Competency Challenges (TLCC)	Challenge in handling different user interfaces Resistance to technology Technological distraction from overly complex technology Challenge of learning new technology by adult learners Lack of technological competency Students technological illiteracy Adult learners' intimidation by learning technologies Resistance to/or confusion about seeking appropriate online help Poor understanding of directions and expectations in 'online learning' of blended learning. Students perception of technology as a barriers to online help seeking	(P. Prasad, Maag, Redestowicz, & Hoe, 2018) (P. Prasad et al., 2018) (P. Prasad et al., 2018) (Salim et al., 2018), (Lightner & Lightner-Laws, 2016) (G. Akçayır & Akçayır, 2018) (Brown, 2016), (Kopcha, Orey, & Dustman, 2015), (Zacharis, 2015) Safford and Stinton (2016) Safford and Stinton (2016) Safford and Stinton (2016) (Kopcha et al., 2015)
Students Isolation Challenges (SIC)	Students alienation and isolation in online learning Students feeling of isolated and disinterested Students problem with synchronous online communication with the use of video projection, the microphones and speakers Remote students uncomfortable being center of attention	Chyr, Shen, Chiang, Lin, and Tsai (2017) Lightner and Lightner-Laws (2016) Szeto and Cheng (2016) (Bower, 2015)
Technological Sufficiency Challenges (TSC)	Insufficient access to technology Inequality of technological accessibility Outdated technology and lack of internet out of the class (in online component) Low bandwidth and slow processing speeds Experience of technical difficulties in completing assignments	Gopalan, Bracey, Klann, and Schmidt (2018) (G. Akçayır & Akçayır, 2018) Safford and Stinton (2016) Safford and Stinton (2016) (Henrie, Bodily, Manwaring, and Graham, 2015)
Technological Complexity Challenges (TCC)	Technological distraction from overly complex technologies Technological complexity Challenge with longer videos for learning	(P. Prasad et al., 2018) (P. Prasad et al., 2018) (Kim, Kim, Khera, and Getman, 2014)

more specific in clearly defining the type of self-regulation challenge in the form of procrastination (AlJarrah, Thomas, & Shehab, 2018; Broadbent, 2017; Maycock, Lambert, & Bane, 2018; J. C. Y.; Sun, Wu, & Lee, 2017), improper time management (Broadbent, 2017; Zacharis, 2015) and improper utilization of online peer learning and online help-seeking strategies (Broadbent, 2017).

The concept of self-regulation has been in existence in various research domains. However, self-regulation in blended learning has received substantial attention through evaluation and relationships with other online learning frameworks and models, notably the renowned community of inquiry (CoI) framework e.g. (Shea & Bidjerano, 2010; Szeto, 2015); and technological acceptance model (TAM) e.g. (Padilla-MeléNdez, Del Aguila-Obra, & Garrido-Moreno, 2013; Yeou, 2016). There are comparably few studies that actually proposed approaches for curating students' self-regulation behavior in the online component of blended learning. Previously, self-regulation behavior support systems have focused on providing a learner centered environment through repeating a training process to learners and guiding them iteratively. Recently for example, the study of (Lin, Lai, Lai, & Chang, 2016) considered using group awareness and peer assistance as external scaffolds in developing a system called 'self-regulated learning with group awareness and peer assistance' (SRL-GAPA) for stimulating students self-regulation behavior in a blended learning environment. The approach has resulted in promoting students' self-regulation behavior outside their face-to-face sessions. Similarly, the study of (Shyr & Chen, 2018) in designing a flipped learning system to stimulate students self-regulation and overall performance has resulted in students not only better prepared before face-to-face meetings, but have also improved students overall academic performances compared to the conventional flipped classrooms.

3.2.1.1. Procrastination. Procrastination, considered as a detrimental behavior has been peculiar and ever present in online learning settings due to the enormous flexibility and autonomy granted to online learners. Students procrastination behavior in traditional face-to-face and blended courses differ because students in blended learning experience a greater sense of transactional distance

compared to fully face-to-face students, due to reduced seat time in blended courses (Boelens et al., 2017a). Because of some level of autonomy and freedom offered in blended courses, students are required to exert higher level of self-control in their online component in order to overcome learner isolation and less spontaneous online interaction nature of blended learning which causes procrastination.

From the results in Table 1 (AlJarrah et al., 2018; Broadbent, 2017; Chuang et al., 2018; J. C. Y.; Sun et al., 2017), have identified self-regulation challenges in the form of procrastination, whereby students face difficulty in proper self-regulation, which results to poor time management and procrastination.

Procrastination is widely considered a psychological dysfunction behavior (van Eerde & Klingsieck, 2018), as such, majority of the research activities on procrastination were from the medical and psychological domain. This results from intervention studies not only been heterogeneous in terms of designs but also in terms of research contents. For instance (Budney, Marsch, & Bickel, 2015, pp. 987–1006), provides a review of computerized therapies of substance addiction – having dire consequences than *per se* procrastination.

Researchers have categorized procrastination interventions in academia into three intervention groups: I) therapeutic treatment – intervention administered after students have demonstrated procrastination behavior; II) therapeutic intervention – aimed at preventing the negative effects of procrastination before it occurs; and III) teacher/instructor intervention. Limited number of effective interventions were proposed for treatment of academic procrastination and they are characterized as products of theories of academic procrastination (Zacks & Hen, 2018). Procrastination intervention studies are relatively less in academia, especially in technology-mediated domains like blended learning. This is because most procrastination intervention offers a generalized treatment approach and has not specifically targeted procrastination behavior in technology-mediated learning environments.

Recently, teacher intervention studies have adopted the use of smartphone based intervention, for example the approach of using SMS reminder system as a stimuli alert to reduce procrastination (Davis & Abbitt, 2013); the use of mobile applications as an intervention tool (Glomann, Hager, Lukas, & Berking, 2018; Lukas & Berking, 2018); and the strategic teaching interventions studies by (Auvinen, Hakulinen, & Malmi, 2015) that increase students' awareness of their behavior using achievement badges. Another teacher intervention approach was found to significantly reduce students procrastination behavior when an online study material is only accessible contingently of completing the previous study exercise, results in reducing students procrastination behavior (Perrin et al., 2011). A recent meta-analysis study on procrastination (van Eerde & Klingsieck, 2018) has revealed the current state of research on procrastination, and highlighted the need for intervention approaches using online learning technologies used in technology-mediated environments (e.g. learning management systems) for treatment of students procrastination behavior.

3.2.1.2. Online help-seeking. Findings notably in Table 1 from (G. Akçayır & Akçayır, 2018; Broadbent, 2017; L. Chen, Chen, & Chen, 2015) reported that students were unable to get appropriate help while out of their face-to-face classes. The study of (Kopcha et al., 2015) highlighted students challenge of perceiving technology in blended learning as a barrier to online help seeking. Similarly (Safford & Stinton, 2016), reported that adult learners get confused and sometimes get intimidated by seeking online help. Possibly, this explains one of the reasons why students resort to seeking online help from other unreliable and informal sources such as 'how-to-do' manuals, search engines (e.g. Google), reading and studying online posts, reviewing conversations or chats on discussion forums, watching videos from YouTube etc. as asserted by (Broadbent, 2017).

Researchers have made considerable efforts in fostering online help seeking initiatives to students through different approaches, commonly through the use of intelligent tutoring systems e.g. see (Mohamed & Lamia, 2018; Mortali & Moutier, 2018; Roll, Aleven, McLaren, & Koedinger, 2011; Vaessen, Prins, & Jeuring, 2014); personalized information seeking systems and adaptive learning systems e.g. see (Lu & Hsiao, 2017) as scaffoldings and facilitators for students' help seeking initiatives. Research have shown that intelligent tutoring systems, which attempt to mimic the role of human tutors are capable of offering intelligent, contextual and curating help through hints or direct feedbacks to students. Research have also shown that inputs, student mindsets, and attributes of help are the three factors influencing students help seeking behavior while programming with computer tutors (Price, Liu, Cateté, & Barnes, 2017).

Another direction that researchers have taken in motivating students towards online help-seeking is through negotiation mechanisms. The study of (Chou, Lai, Chao, Tseng, & Liao, 2018) proposed a negotiation-based adaptive learning system for regulating students help seeking behavior due to many influential studies (Z.-H. Chen, Lu, & Chou, 2019; Chou, Lai, Chao, Lan, & Chen, 2015; Lan, Graf, Lai, & Kinshuk, 2011) confirming that negotiation between students and system improves students metacognition. These approaches are basically designed to offer online help as a scaffolding for accomplishing in-class assignments, tutorials, quizzes or examinations. For example, the negotiation-based approach of (Chou et al., 2018) regulates students help-seeking behavior by encouraging them to seek help from the system's suggested answer tips, and also, preventing them from seeking too much help or executive help. Furthermore (Cummins, Beresford, & Rice, 2016; Fautch, 2015; Hardin & Koppenhaver, 2016), utilized discussion boards and text messages to offer instant help as a form of feedback while students are out of their face-to-face classes. Additionally, a web-based help seeking system 'EchoLu', designed based on four design principles: Students privacy needs in help seeking; students awareness of teacher support; promotion of observability peers' help seeking activities; and promotion of social support has resulted in motivating students online help seeking initiatives in a flipped classroom (Kopcha et al., 2015).

Basically, students are known for seeking help through their institutions' online platform by connecting and interacting with peers through discussion forums and online blogs. The study of (Türel, 2016) asserted that writing skills and detailing explanations on discussion forums affect online students in considering the usefulness of an online platform, thereby determining students' proper utilization of the platform for interaction and help-seeking. Higher order detailing of explanations in online and discussion forums would possibly be more beneficial to students that do not prefer face-to-face conversations and classroom interactions. For example

(Hsu & Hsieh, 2014), found that Taiwanese students are reluctant to active classroom interactions and are traditionally less out-spoken. This highlights the importance of taking cultural and geographical background factors into consideration for designing a blended course. It is clear that higher order writing and detailing explanations in online platforms play a key role in students' self-regulation and a motivating determinant for online help-seeking initiatives.

Another challenge faced by students in online environments when seeking help is that students perceive online discussion forums less private than for example an email. Students feel less comfortable in sharing or inquiring every information or help, and are reluctant in detailing such inquiry (Türel, 2016). Possibly, students in online environments would continue ignoring online help seeking due to the obvious reasons highlighted in the study of (Z. Sun, Xie, & Anderman, 2018). Therefore, affecting a spontaneous learning environment in which every learner is respected, valued and cherished would possibly boost online peer learning and help seeking self-regulated learning strategies.

3.2.2. Technological literacy and competency challenges

In addition to other skills required from a student, computer and technological literacy and competency has become necessary for students in pursuit of today's modern education. Educational learning materials are being embedded in technologies, and gaining access and utilization of these materials depend on individual's literacy and competency level. The findings of (Brown, 2016; Zacharis, 2015) from Table 1 highlighted the lack of literacy from students concerning the use of technology for learning as a drawback on blended learning instruction. Zacharis (2015) mentioned that students' technological illiteracy and poor time management skills have led to delays in receiving immediate feedbacks from their teachers, thereby rendering students uninterested and procrastinating their study activities. Similarly (S. C. Chen, Yang, & Hsiao, 2016), reported the challenges faced by students in the form of learning a new technology especially by adult students (Lightner & Lightner-Laws, 2016; Safford & Stinton, 2016; Salim et al., 2018) (see Table 1). This finding possible explains why students are intimidated by technology (Safford & Stinton, 2016).

Similarly (G. Akçayır & Akçayır, 2018; Jensen, Kummer, & Godoy, 2015), from Table 1 stressed the need for technological competency for blended learning students. Because, blended learning students are presumably considered to be reasonably competent with technology; having no problem with online activities such as online peer learning, help seeking, problem solving and technical know-how; incompetency with learning technologies can be disastrous and possibly become an impediment to students in realizing the merits afforded by blended learning.

Another noticeable challenge faced by blended learning students is dealing with different technological user interfaces (P. Prasad et al., 2018). This becomes obvious with the evolvement of wide range of operating systems, computer hardware and software technologies. Students lacking competence and proficiency with the use of various hardware and software technologies might not be able to handle the complexity of technological variations and interfaces successfully for studying. Although, M. Akçayır, Dündar, and Akçayır (2016) argued that the current generation of students are presumed to experience less difficulties in using technology than the former generations as they are considered 'technological born'.

3.2.3. Students isolation challenges

Students study activities like reading, assignments and preparations before face-to-face classes are challenged due to lack of motivation, alienation and isolation that students in their online component. From Table 1 (Chyr et al., 2017; Lightner & Lightner-Laws, 2016), reported the level of discomfort and anxiety that students experience due to isolation in carrying out study activities. Two noticeable findings from the results have highlighted a similar problem with the blended synchronous learning mode that students feel unease and uncomfortable in using video projection, microphones and speakers (Szeto & Cheng, 2016), and also being the center of attention (Bower, 2015).

Students possibly fall into isolation and alienation due to their hesitance to participate/engage in online communities. This might be as a result of a number of reasons such as personality, sense of transactional distance in online environments, lack of confidence and trust in the online community participants, lack of communication cues (facial expression, voice tone etc.), connection difficulties (e.g. low internet speed), poor writing skills or language barrier. Therefore, building online social presence - as part of the three elements of community of inquiry framework, through identifying and participating in an online community, and building sound relationships with the online participants have proven to be a key contributor in students' academic success (D Randy Garrison, 2011) especially in technology-mediated learning such as blended learning.

3.2.4. Technological sufficiency challenges

Since blended learning requires students to have access to technology – both hardware and software, whether provided by themselves or by their educational institution, the challenges of technological accessibility cannot be ignored. Akçayır & Akçayır (2018); Chen et al. (2015) in Table 1 mentioned students worries of not having equal access and technological support with other peers. Similarly, the study of (Safford & Stinton, 2016) reported students experiencing difficulty with internet connection in their online component, and also difficulty in dealing with outdated technology. Students may possibly feel the adoption of blended learning as a biased mode on instruction by rendering them unequal with their peers concerning the level of online learning technologies. Moreover (Safford & Stinton, 2016), also reported students complain concerning access to modern technologies for learning, and their online activities are troubled by low speed internet.

3.2.5. Technological complexity challenges

Findings from (Prasad, Maag, Redestowicz, & Hoe, 2018) in Table 1 reported students complain on the complexity of technologies installed by their educational institutions for online activities, as such, students spend significantly more time on learning how to use

these technologies. Interestingly, students become overly excited and distracted with the technology being employed particularly the software aspect; which results in refocusing students' attention on the innovative features and complexities of the online learning environment than learning on the online environment. Technological distractions and complexity in particular can possibly be understood by educational institutions employing and installing state-of-the-art technology in order to compete and update/upgrade the existing instructional technology. Nevertheless, students may possibly be one step behind a technological innovation and therefore may find it complex and become incompetent in using the technology for learning.

Another possible explanation of students being distracted by technology is the provision of technologies and services that students do not have access to, or are lacking in their homes. For example, a high broadband Wi-Fi, which students can use for other non-educational purposes like faster video streaming on YouTube, downloads and other non-educational purposes. Although, the studies of (Wang, Han, & Yang, 2015) highlighted the necessity of educational institutions in constantly replacing older technology with newer ones as a theme across the blended learning literature. Nevertheless, educational institutions should constantly moderate between students' technological needs and sufficiency; and technological gold plating as this would possibly reduce misuse or abuse of technological resources.

Despite the benefits associated with online learning videos such as the authenticity of teachers emotions, demeanor (Borup, West, Thomas, & Graham, 2014) etc., results from (Kim et al., 2014) reported students complain of longer videos for learning. Kim et al. (2014) mentioned students verdict on online content being "bulky, cumbersome and too much to digest". Research carried out on videos for learning have indicated that online video lectures having a poor or limited pedagogical and technical features negatively affect student learning experience in a flipped classroom (He, Holton, Farkas, & Warschauer, 2016). Another example is the study of (Giuliano & Moser, 2016) which found that the length of an online video is inversely correlated with the percentage of videos viewed by students. Some researchers recommended that the length of an online video should not exceed 20 min considering most students' attention span (Kaya, 2015; Mason, Shuman, & Cook, 2013).

3.2.6. Discussion on RQ1 findings

Arguably, the five categories of students challenges highlighted in Table 1 are related to one another. For instance, technological illiteracy and incompetency undoubtedly contributes to students' isolation, as well as students' poor self-regulation skills out of their face-to-face sessions.

Although, it is agreed that technology support students learning, researchers have stressed the importance of placing students at the center of learning experience, not the technology. Recent research has shown that traditional learning management systems fall short in providing a collaborative and interactive online community, which essentially offers students sense of ownership. The approach of improving students online social presence by integrating social network sites with traditional learning management systems has proven to significantly impact students learning outcome, and has brought higher level of students' satisfaction and engagement by intervening on some of the challenges that students face with technology in their online components. Furthermore, a greater sense of online closeness would surely nurture students' behavior and possibly reduce isolation and seclusion outside face-to-face sessions. The studies of (Özmen & Atıcı, c2014a, 2014b; Thoms & Eryilmaz, 2014) show the merits of integrating social networking sites with learning management systems in positively affecting the quality of communication between students and also between students and their instructor(s), thereby improving and sustaining the level of social interaction and ensuring an overall engaging learning experience. Therefore, students enrolled in institutions where social networking sites are employed for online activities would possibly experience a reduced level of the identified challenges in Table 1.

While the goal of blended learning to students is to provide them with richer learning experience through careful structuring of face-to-face and online components, research has proclaimed how these two components support each other in reducing the worries associated with each component. The face-to-face introductory meeting sessions which usually takes place at the beginning of a blended course typically provides students with information about the institution, study expectations, introducing the institution technologies (e.g. the learning management system) and so on. The human touch experience in face-to-face introductory meeting initiates social activities of the online component by stimulating social interaction and communication between students and their teacher(s), and also among the students (Boelens et al., 2017a; R.; Graham, 2006, pp. 3–21). As such, students would have a sense of feeling of who their peers and even their teacher(s) actually are. Introductory face-to-face meetings have shown to be a promising approach in promoting students' understanding with their peers one, thereby lessening the level of unfavorable challenges highlighted in Table 1. On the other hand, the excellence of online social interaction and optimization of the online component enriches and supports the face-to-face component, whereby students feel increasingly comfortable with their peers when they meet in the face-to-face sessions. From the students' point of view, careful structuring of the face-to-face and online components would lessen the challenges highlighted in Table 1.

3.3. RQ2: what are the challenges that teachers face in the online component of blended learning?

3.3.1. Teachers technological literacy and competency challenges

Teachers technological literacy and competency challenges is the first category of reported challenges that teachers face in the online component of blended learning. From Table 2, the studies of (Lightner & Lightner-Laws, 2016) in particular reported that teachers lack confidence, time and willingness to learn new technology for teaching a blended course. Another reported challenge is teachers lack of experience with creating instructional content on learning management systems (Maycock et al., 2018). Furthermore, some of the studies reported teachers technological illiteracy (Brown, 2016) and resistance to use new technology for teaching (Bower, 2015; Hung & Chou, 2015). Other literacy and competency challenges highlighted include the difficulty of learning new

technology for creating and managing online courses (Lightner & Lightner-Laws, 2016); teachers' resistance to technology (Brown, 2016; Wanner & Palmer, 2015); technological illiteracy and technological anxiety (Brown, 2016); technological incompetency (Pilgrim, Hornby, & Macfarlane, 2018); and unwillingness to learn and use technology for teaching (Hung & Chou, 2015).

In a blended asynchronous learning setting (see Table 2), overly focused on remote students; time wasting in troubleshooting technical problems; challenge of managing students in both modes were the key challenges that teachers face in steering an effective blended asynchronous class (Bower, 2015).

3.3.2. Online video challenges

The task of creating quality online video has been a top challenge for teachers especially in flipped classrooms. From Table 2, G. Akçayır and Akçayır (2018) mentioned that teachers should pay more attention to the quality of instructional videos (interesting and short) and also, the provision of interaction or communication tools for easing students to obtain feedbacks. In addition (G. Akçayır & Akçayır, 2018), reported that teachers face difficulty in making quality online videos. Similarly (Brown, 2016; Long et al., 2017), reported a similar challenge that blended learning teachers spend too much time and effort in creating online teaching content especially videos. Leo and Puzio (2016) revealed that blended learning teachers find it weighty to create and share online video with slow internet connectivity.

3.3.3. Technological operation challenges

The third set of challenges that teachers face in the online component of blended learning is technological operation challenges. Teachers find it challenging to seamlessly operate and use instructional technologies proficiently. From Table 2, teachers are worried with regard to troubleshooting technical problems (Leo & Puzio, 2016), time consuming in resolving technical difficulties (Bower, 2015) and time consuming and difficulty in designing and managing online courses (Lightner & Lightner-Laws, 2016).

3.3.4. Teachers belief challenges

The last category consists of set the of reported beliefs about using technology for teaching. Technology as a barrier to competency (Pilgrim et al., 2018), flipped classroom regarded as one of the barriers between technology and teachers (Zengin, 2017), teachers' skepticism about the effectiveness of online instruction in improving learning (Lightner & Lightner-Laws, 2016) were the reported negative perceptions and beliefs from blended learning teachers with regard to using technology for teaching.

Table 2
Teachers challenges in the online component of blended learning.

Inductive categories (Codes)	Sub-categories	Articles
Teachers Technological Literacy and Competency Challenges (TTLCC)	Challenge in making students aware of the online materials that are available as part of their learning program	Cuesta Medina (2018)
		Cuesta Medina (2018)
	Challenge of training students in the use of online materials and effective approaches to autonomous learning	(G. Akçayır & Akçayır, 2018)
		Maycock et al. (2018)
	Lack of technological competency	Boelens et al. (2017a)
	Lack of experience with creating instruction content on LMS platforms	Cheng and Chau (2016)
	Challenge in fostering an affective online learning climate	Brown (2016)
	Challenge in learning a new technology to manage online courses	(Hung & Chou, 2015),
	Technological Illiteracy	(Bower, 2015)
	Resistance to technology	Lightner and Lightner-Laws (2016)
	Teachers lack of confidence, the time, and willingness to learn the use of technologies for teaching	(Brown, 2016)
	Technological anxiety	
Online Video Challenges (OVC)	Challenge in making quality online videos	(G. Akçayır & Akçayır, 2018)
	Spending too much time and effort in creating online teaching contents (videos)	Long et al. (2017)
		Brown (2016)
	Time consuming and difficulty in creating and editing an online video content	(Leo and Puzio, 2016)
	Sharing of online videos is weighty with slow internet connections	
Technological Operational Challenges (TOC)	Challenge in making students aware of online materials that are available as part of their learning program	Cuesta Medina (2018)
		Cuesta Medina (2018)
	Challenge of training students in the use of online materials and effective approaches to autonomous learning	Leo and Puzio (2016)
		Lightner and Lightner-Laws (2016)
	Resolving technical difficulties is time consuming	
	Time consuming in designing and managing online course	Bower (2015)
	Time wasting in troubleshooting technical problems	Bower (2015)
	Managing students in both modes (online-synchronous & online students) is challenging to teachers.	(Bower, 2015)
	Overly focused on remote students	
Teachers Belief Challenges (TBC)	Technology as a barrier to competency	Pilgrim et al. (2018)
	Flipped classroom regarded as one of the barriers between technology and teachers	Zengin (2017)
	Skepticism about the effectiveness of online activities in improving learning	(Lightner and Lightner-Laws, 2016)

3.3.5. Discussion on RQ2 findings

Teaching in blended learning requires teachers to have reasonable technological competence. Because of the role of technology and students curiosity and interest in technology, teachers must have the necessary technological and pedagogical support from their institutions to motivate them in fully integrating technology with traditional face-to-face teaching proportionally.

From Table 2, it is clear that blended learning teachers are characterized with illiteracy and incompetency in using technology for teaching. The manifestation of illiteracy and incompetency (n = 11) with technology for teaching has certainly led to the other four categories of teacher challenges in Table 2. Thus, technological beliefs (n = 3), online video challenges (n = 4) and technological operation challenges (n = 7) are all part of the wider scope of technological illiteracy and incompetency challenges from teachers in the online component of blended learning. Similarly, Technological resistance and illiteracy are possibly connected in a way that teachers who are below-par in technological literacy or competency are likely to resist the use of technology for teaching. They would prefer resorting to the fully face-to-face teaching method.

The struggles in fully adopting technology for teaching as reported by (Brown, 2016; Hung & Chou, 2015) might be viewed as a distraction and disruption to instruction. Teachers might view blended learning as an instruction having two teaching components to deal with. Teachers repulsiveness and unwillingness to learn and use online technology can possibly be linked to the studies that highlighted teachers' complains on lack of proper training and motivational support from their institutions in using technology for teaching (Cuesta Medina, 2018). Although, teachers are themed with reluctance to technological use for teaching, institutional culture and practices contributes to teachers' negative perception and repulsiveness towards the use of technology for teaching. For example, blended learning teachers revealed in an interview that their University has not defined the type of blended learning to implement (e.g. blended or flipped), and the type of blended learning suitable for a particular course or set of students (Jobst, 2016).

Another explanation for teachers struggle in online component of blended learning is that teachers might have to deal with the creation of online learning communities through which online discussions, help seeking, experience sharing etc. can take place, so as to establish and sustain a sense of closeness in the online component. Teachers might feel the necessity of an online community in order to reduce online transactional distance; the foreseen harms of isolation and alienation; and lack of motivation for students to study (Chyr et al., 2017; Lightner & Lightner-Laws, 2016) (see Table 1) in the online component. Secondly, because of the reduced seat time in blended learning - as the face-to-face meetings or class sessions are replaced with a significant portion of online activities, teachers might be worried about passive and inactive students in the online component and might therefore, constantly need to keep in touch and monitor their activities possibly via email, text messaging, direct phone calls or even traces of their online group discussions. Thirdly, teachers might feel the need to guide their students especially novice students, in organizing their online activities, making them aware of the online learning materials available to them as highlighted in Table 2. The task of making students aware of online materials that are available as part of their learning program, guiding students in using the online materials and effective strategies to autonomous learning are challenging tasks to teachers (Cuesta Medina, 2018). These perceived responsibilities and tasks might render blended learning teachers in having less time to master and learn the technology for teaching, thereby developing negative beliefs and skepticism of adopting technology for teaching. This possibly explains the identified challenges in the study of (G. Akçayır & Akçayır, 2018) from teachers perspective as time consuming (Wanner & Palmer, 2015), higher workload (Sage & Sele, 2015), difficult to manage tasks (L. Chen et al., 2015) and difficulty in planning the sequence of activities (Schneider & Blikstein, 2016).

Another possible explanation of blended teachers' resistance, incompetence and illiteracy in using online technology for teaching might be as a result of their longevity and age-wise of teaching in traditional face-to-face method. Teachers satisfactory routine method, loyalty and proficiency of traditional face-to-face is challenged and disrupted with the ever emerging and innovating technology, as (M. Akçayır et al., 2016) argued that the current generation of students are assumed to experience less problems in using technology. This conversely means that older generation cohorts of teachers are likely to be less competent in using technology.

Another possibility that comes into the mix is that blended teachers might require the need to constantly enroll in training sessions for every new technology installed in their educational institution, which is also another burden or considered as a 'course' by itself. Again, teachers are constantly under pressure to deal with technical issues and online interactions for their blended courses (Ocak, 2011). Teachers are likely to be confused on how to seamlessly structure and manage course materials in both face-to-face and online components. By referring to the technological acceptance model (TAM), students' and teachers' perception of ease of use and perception of usefulness can be reasoned as the two major predictors of acceptance and use of online technology for educational purposes.

The task of creating quality online videos has been a top challenge to teachers especially in flipped classrooms (see Table 2). Definitely, teachers spend too much time and effort in creating quality video for students; reviewing, uploading and sharing a lengthy video might be time consuming, difficult and frustrating with slow internet connections. This is the reason why there is a growing concern that blended teachers might spend significant amount of time in learning technology for teaching than on delivering the instructions to their students (Hung & Chou, 2015). As such, the challenges of creating quality online videos for students is self-explanatory from the obvious results of teachers' technological incompetency, illiteracy and negative perceptions about the use of technology for instruction.

3.4. RQ3: what are the challenges that educational institutions face in the online component of blended learning?

The rapid nature of technological innovations and inventions means that educational institutions must always assess the provision of required technological support in meeting their teachers' and students' requirements. Educational institutions are liable of having a clear picture of their teachers and students' technological literacy, competency and proficiency level in order to mount a dependable

Table 3

Educational institution challenges in the online component of blended learning.

Inductive categories (Code)	Sub-categories	Articles
Technological Provision Challenges (TPC)	High cost of producing electronic content Cost of online learning technologies Overly complex technology – distractions to students Creation of tools that are flexible and compatible with other systems Complexity of technology Implementation of LMSs to suit students learning styles	Dehghanzadeh and Jafaraghaee (2018) (G. Akçayır & Akçayır, 2018) (P. Prasad et al., 2018) Brown (2016) (Brown, 2016) (Cheng and Chau, 2016)
Teachers Training Challenges (TTC)	Challenge in training teachers in the use of online materials and effective approaches to autonomous use of online technologies for instruction	(Cuesta Medina, 2018)
Other Challenges (OTC)	Lack of electronic technicians	(Dehghanzadeh and Jafaraghaee, 2018)

and vigorous technological infrastructural support and diversified learning management systems as a prerequisites for implementing a successful blended learning (Y. Chen, Wang, & Chen, 2014; Wang et al., 2015).

Over the years, blended learning research community has provided guidelines and directions for institutional adoption and implementation of blended learning from the studies of (C. R. Graham et al., 2013; Wendy W Porter & Graham, 2016; Wendy W Porter et al., 2016; Wendy W. Porter et al., 2014). However, a substantial amount of understanding the key challenges that institutions face in employing suitable technologies for instruction is lacking in blended learning research community. Blended learning literature have focused on students' and teachers' struggle with the online component whereas, little is said on institutions struggles in effecting a sustainable online component to blended learning.

3.4.1. Technological provision challenges

From Table 3, (G. Akçayır & Akçayır, 2018; Dehghanzadeh & Jafaraghaee, 2018) highlighted educational institutions challenges on the cost of online technologies, maintenance cost, training costs and obtaining suitable 'state of the art' technologies to foster an effective blended learning environment. Secondly, the studies of (P. Prasad et al., 2018) in Table 3 highlighted that one of the challenges that educational institutions face is determining the level of technological innovations, robustness and complexity that is suitable for their teachers and students online component activities. Institutions are challenged with regulating the level of technological complexity for instruction. This complexity can possibly be in the form of the learning management systems or the physical hardware installed in the institution; and also, the seamlessness of operation between the hardware and software in providing an effective online learning experience. Moreover (Brown, 2016), mentioned that blended learning institutions face challenge of seamless integration of new technologies that are flexible and compatible with the existing or new technologies.

3.4.2. Teachers training challenges

The results in Table 3 can be understood that teachers in blended learning mode of instruction suffer from lack of institutional training in using technology for teaching. From Table 3 (Cuesta Medina, 2018), pointed that one of the key challenges to educational institutions is providing effective training to teachers and students in attaining the benefits offered by the online component of blended learning. One possible explanation of institutions reluctance in providing effective training support to teachers and students for online component activities in blended learning might be that educational institutions possibly feel relatively less training is required to both teachers and students due to face-to-face interventions; and teaching blended courses does not require extensive technological and online instructional training and support compared to fully online learning. Therefore, any difficulty or challenge encountered in the online component can be clarified and addressed during the face-to-face sessions.

Another explanation of institutions reluctance in providing effective training support to teachers is cost. For instance, not all institutions can pay for the cost of 'quality matters' (QM) professional development to its teachers. Blended learning teachers that are not sponsored by their institutions on such professional training might fall short in delivering the promise of blended learning to their students.

3.4.3. Other challenges

Lastly, the study of (Dehghanzadeh & Jafaraghaee, 2018) in Table 3 reported a lack of electronic technician in fixing and repairing the institutions' online technologies. Similarly, some studies also highlighted lack of immediate support for fixing technical problems of instructional technologies are frequent challenges that blended teachers experience while teaching with technology (Ocak, 2011) (Fig. 2).

4. Discussion

4.1. Summary of findings and discussion

As technology advances every day, new requirements in blended learning evolve accompanied with new set of challenges. Stakeholders therefore find it difficult to address these challenges. The skills required for students and teachers in accessing online
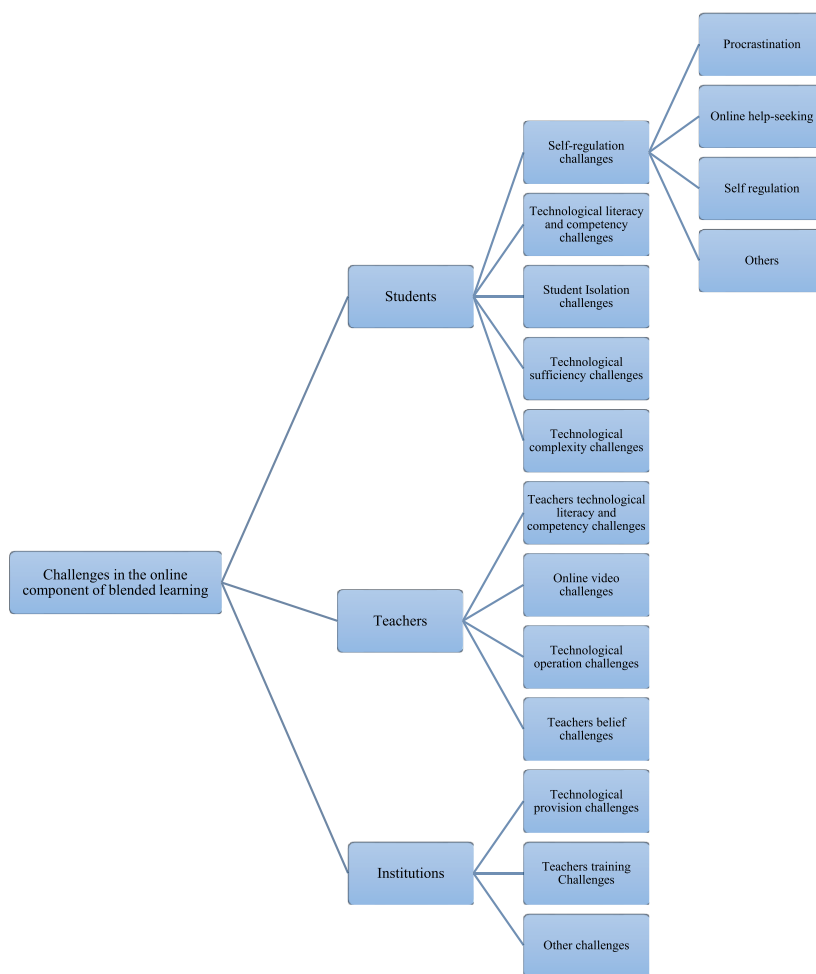
Fig. 2. A taxonomy of challenges in the online component of blended learning.

educational materials change on a regular basis, as stated by (Maycock et al., 2018) that the speed at which technology is used for educational purposes is overwhelming for both digital and non-digital born students. The findings of this study has resurface several challenges that hinder the true realization of blended learning mode of instruction from the perspectives of students, teachers and educational institutions.

First, our review found students' self-regulation related challenges as one of the obvious group of challenge that students face in their online component of blended learning. Self-regulation has been an inherent problem that hinders several technology-mediated mode of instructions from achieving true excellence. Our study has found that blended learning researchers have focused more on stimulating the more-general students' self-regulation (see Table 4) through various intervention approaches, and have not aimed at other specific types of self-regulation behavior such as procrastination in the online component of blended learning.

Secondly, our study has uncovered a number of related challenges with the use of technology from both students and teachers. From our findings, we understood that students are willing and positive about using technology for studying. Most of the technological challenges that students encounter point to their inability of making proper use of the available technology for studying; and the prospects on the level of support the technology would offer to them. The results of students challenges from our study can be summarized in the following statement: 'I cannot properly use technology for studying'. This is in line with various studies that labeled students of nowadays as technological born. Thus, blended learning students have acknowledged the use of technology for studying, but they cannot effectively use and maximize the benefits afforded by such technologies for studying. Blended learning institutions should support students in the effective use of technology for their online activities. Although, researchers in various online learning disciplines have proposed varied approaches for addressing technological complexity, literacy and competency (Klašnja-Milićević, Vesin, Ivanović, & Budimac, 2011; Rahman & Abdullah, 2018); these initiatives have proven to reduce learning systems complexity and also improve students' overall performance; therefore these approaches should be tested specifically in blended learning environments.

On the other hand, the challenges of using technology for teaching has been the title of teachers challenges in this study. Largely, these challenges originated from teachers' negative perceptions and skepticism about the effectiveness of technology for instruction,

which resulted to their reluctance, illiteracy and incompetency level; and consequently their inability to proficiently operate and use technology for teaching. Our study shows that the technological challenges that teachers encounter point to their unwillingness and reluctance in using technology for teaching. The results of teachers' challenges from our study can be summarized in the following statement: 'I do not want to use technology for teaching'.

It is quite clear that blended teaching involves combination of varied sets of technological tools and teaching methods that need careful consideration to improve students learning. Our study has shown that the challenges associated with blended learning as a whole has greater impact on blended teachers because educational institutions are more concerned about their students than their teachers; and also students are more proficient and technologically competent in using technology for studying than teachers using technology for teaching. Furthermore, it is still unclear whether teachers' reluctance to use technology for teaching is largely due to their longevity in face-to-face teaching, as some studies e.g. (Ocak, 2011) suggested that teachers need to overcome their own fears by themselves to excel in effecting a successful blended learning; or it is largely due to their institutions negligence in investing and provision of effective intervention training and development programs.

In general, blended learning research community have focused more on students' challenges, on the other hand, relatively less attention was given to teachers' struggles. Thus, there is need for additional investigations on correcting teachers' negative perceptions of using technology for instruction. Likewise, blended learning institutions should contribute by easing these negative perceptions through development and training programs to their teachers. Interestingly, it is important to discuss that our review has not found any complain about teachers' self-regulation challenges. In addition, our study has found few studies highlighting a generalized training exercises/programs that educational institution offers to pre-service and in-service teachers. These training programs were generalized workshops/programs to blended learning as a whole.

Supposedly, the concept of technological affordances can be adopted to lesser the level of the identified challenges in using technology for teaching and learning. Because, many of the available technologies deployed in educational institutions are not specifically designed for instructional purposes. The success of technology depends on educators' capability in analyzing the educational merit, the affordances and constrains in them so as to strategically repurpose them for educational context (Bower & Sturman, 2015; Mishra & Koehler, 2006).

Thirdly, our study reveals educational institutions challenges with the online component of blended learning is mainly in providing effective training support to teachers, and also provision of suitable instructional technology. Our study also highlights cost as an impediment for educational institutions in providing the optimum platform for blended learning instruction. Educational institutions should periodically assess how their students' and teachers' technological competency level and requirements has changed over time in order to accommodate the needed technology for instruction. Education institutions should periodically evaluate their blended learning by reviewing and evaluating their standards for instance, using quality matters (QM) rubric.

Arguably, the challenges identified from students (RQ1), teachers (RQ2) and educational institutions (RQ3) perspectives are not mutually exclusive, they cross boundaries. For example, lack of sufficient technological competency and literacy on using technology for instruction from teachers is related to lack of effective training support from their institutions. Similarly, students' ability to self-regulate their behavior as well as the motivation and zeal to learn and use online technology for studying largely depends on the technological infrastructure and services provided by their institutions. Likewise, when institutions do not support teachers' professional development, teachers are bound to fall short in fostering students to optimize their online activities as such, rendering students to poor self-regulation behavior (reluctance to help seeking and collaborative learning, procrastination, etc.) and seclusion.

Table 4
Summary of existing solutions of the identified challenges in blended learning domain.

Study	Environment	Challenge	Technique/Approach
(Shyr and Chen, 2018)	Flipped Classroom	Self-regulation	The use of technology that employs planned instructional strategies with sustainable support of self-regulation.
(Mohamed and Lamia, 2018)	Flipped Classroom	Online help-seeking	Using an Intelligent Tutoring System (ITS) to support students in programming tasks.
(Lin et al., 2016)	Blended Learning	Self-regulation	Group awareness and Peer assistance as external scaffolds to foster Self-regulation
(Lai and Hwang, 2016)	Flipped Classroom	Self-regulation	System consisting: Out of class learning system, a self-regulated monitoring system, a teacher management system, and a database
(Hardin and Koppenhaver, 2016)	Flipped Classroom	Online help-seeking	The use of discussion board to offer help
(Fautch, 2015)	Flipped Classroom	Online help-seeking	The use of discussion board to offer instant help in form of feedback
(Kopcha et al., 2015)	Flipped Classroom	Online help-seeking	Web-based help-seeking tool (EchoLu) designed based on 4 design principles: Student's privacy needs in help seeking, Student's awareness of teacher support, promotion of observability peers' help seeking activities, promote social support

4.2. Future research recommendations

Several intervention approaches were employed in addressing the identified challenges of our study especially from students' perspective, but few of the studies have actually addressed these challenges in the blended learning domain. Apparently, students,

teachers and educational institutions behavior vary in different domain. For example, self-regulation behavior in massive open online courses (MOOCs) should not be considered the same as in blended learning due to the presence of face-to-face interventions. Therefore, the concept of solving these challenges must be visualized in their own domains. Overall, in order to make relevant recommendations for future research, we need to keep in mind that the existing solutions of the identified challenges provided from the literature were mostly not from the blended learning domain. Furthermore, some solutions proposed were not precise in defining their actual application domain. We need to seriously provide accurate solutions to the existing identified challenges specifically in blended learning domain. In accordance with the results and insights turned out by this review, we propose the following future research recommendations:

- Effective intervention for students' procrastination behavior in the online component of blended learning.
- Fostering students' self-regulation behavior through online social identity groupings.
- The relationship between students' online help seeking behavior and procrastination in online component of blended learning.
- Additional investigations to the underlying issues beneath challenges such as persistence (i.e., students' motivation to learn and the troubled emotions they experience in these environments)
- How higher order writing and detailing explanation in discussion forums or online platforms impacts technological acceptance, initiates students' self-regulation and online help seeking behaviors.
- The most pronounced challenges from students and teachers' perspectives are self-regulation and the use of instructional technologies respectively. As such, it would be interesting to investigate the relationship between teachers' technological literacy and competency level with students' self-regulation behavior.
- The effect of accreditation programs and quality matters programs in supporting blended learning teachers to effectively use technology for instruction.

5. Limitations

This review study is limited with the employment of a rich search selection criteria and methodology in order to only consider the journals deemed as 'high impact'. Therefore, if we had consulted other literature sources like Google Scholar; or by considering conference papers, our results might slightly differ. Secondly, our review findings are restricted by focusing solely on blended learning literature, and not for example - the wider scope of e-learning, as such, our results might have offered more insight into the identified challenges of our study. Another notable shortcoming is the unavailability of some studies, or studies that were not written in English language. Nevertheless, this study should be sufficient in portraying a road-map to future research in blended learning.

6. Conclusion

This study presents a systematic literature review revealing the current challenges in the online component of blended learning from students, teachers and institutional perspectives. In spite of our research foundation being rich, it is very difficult to identify all the challenges due to the rapid advancements of technological innovations and the complex nature of human behavior. We discussed the concept of blended learning, the advantages of blended learning instructional approach over other related instructional approaches. We then examined 594 studies published in blended learning from 2014 to 2018 by adopting Kitchenham's systematic literature review methodology in order to identify the reported challenges in the online component of blended learning. We examined and categorized the challenges from the perspective of students, teachers and educational institutions.

We learned that researchers and blended learning practitioners have paid more attention on addressing the overall blended learning design challenges, comparing the types of blend and other blended learning dimensions. We also learned that researchers and blended learning practitioners have focused more on students' challenges in the online component of blended learning, thus teachers and education institutions challenges receiving relatively less consideration. We also learned that students suffer from self-regulation challenges and inability to effectively use technology for studying; teachers main challenge is their unwillingness and negative perception of using technology for instruction; while educational institutions find it difficult in providing the correct and sufficient technological infrastructure, as well as providing effective training support to their teachers. We also learned that the challenges associated with online component of blended learning as a whole has greater impact on teachers. One of the most outstanding finding of this study is the series of different types of challenges that teachers' face in using technology for teaching. Thus, this review study can serve as a guide in refocusing blended learning research towards finding solutions to the identified challenges that students, teachers and educational institutions face in the online component of blended learning which deter the promise of blended learning mode of instruction.

Acknowledgement

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