

Attachment 1: Strengths and weaknesses in online learning for medical students

Study	Year	Nation	Design	Strengths	Weaknesses
Chinelatto et al. [13]	2020	Brazil	Review	<ul style="list-style-type: none"> • More free time • Useful for building time management skills 	<ul style="list-style-type: none"> • Not applicable to clinical case discussion and practice • Lack of accurate evaluation • Heterogeneity of classroom quality • Lack of human contact
Andersen et al. [14]	2022	America	Cross-sectional	<ul style="list-style-type: none"> • Increased learning flexibility • More time with family and enjoy other interests 	<ul style="list-style-type: none"> • Lack of in-person social interaction • Unstable network connectivity • Inability to access study materials on time • No real clinical experience
Kaurani et al. [15]	2021	India	Web-based survey	<ul style="list-style-type: none"> • Abundant learning resources • Facilitate a transformation of the learning process from teacher-led passive learning to student-centered active learning 	<ul style="list-style-type: none"> • Overly fact-based teaching • Not suitable for practical training
Kaur et al. [16]	2021	Punjab, India	Cross-sectional	<ul style="list-style-type: none"> • Comfortable study environment • Flexibility • Ability to continue learning during blocked periods • Diverse learning content • Access to digital expertise 	<ul style="list-style-type: none"> • Family interruptions • Lack of learning equipment • Technical barriers • Limited access • Security problems • Physical health problems, like visual fatigue, headaches
Bączek et al. [17]	2021	Polish	Cross-sectional	<ul style="list-style-type: none"> • Ability to stay at home • Reduce the cost of accommodation and transportation • Comfortable environment • Sustainable access to online learning resources • Permission to learn at your own rhythm • Ability to record sessions 	<ul style="list-style-type: none"> • Absence of interaction with patients and teachers • Technical issues with IT devices • Lack of self-discipline • Social isolation
Schlenz et al. [18]	2020	Germany	Cross-sectional	<ul style="list-style-type: none"> • More modern, fun, and accessible • Less time effort • Motivating learning • Better knowledge delivery 	<ul style="list-style-type: none"> • Cannot meet practical courses
Rajab et al. [19]	2020	Saudi Arabia	Cross-sectional	<ul style="list-style-type: none"> • Promote self-regulation and responsibility 	<ul style="list-style-type: none"> • Communication and assessment issues
Mortagy et al. [20]	2022	Egypt	Cross-sectional	<ul style="list-style-type: none"> • More comfortable • Reduced commute • Permission to learn at one's own rhythm • More flexible and cost-effective 	<ul style="list-style-type: none"> • Poor network connectivity • Decreased communication • Family disturbances

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Dost et al. [21]	2020	The United Kingdom	National cross-sectional	<ul style="list-style-type: none"> • No travel • The ability to study at their own pace • Flexibility • More comfort • Reduced costs • Reduce anxiety • Give students more time to prepare for clinical placement 	<ul style="list-style-type: none"> • Internet connectivity issues • Family distractions • Increased equipment needs • Additional study space required • Difficulty concentrating and asking questions • Weakening students' clinical capability and confidence • Surging in choice • Lack of communication
Baticulon et al. [22]	2021	Philippines	National cross-sectional	<ul style="list-style-type: none"> • No mentioned 	<ul style="list-style-type: none"> • Increased equipment demand • Limited access and network connectivity • Lack of patient contact • Excessive cognitive load • Unlimited Internet access • Family disruptions I • Health problems • Insufficient assessment • Insufficient feedback from teachers
Saurabh et al. [23]	2021	India	Descriptive cross-sectional	<ul style="list-style-type: none"> • Study at home 	<ul style="list-style-type: none"> • Limited student-instructor interaction • Easily bored • Lower classroom efficiency • Not applicable to practical courses • Inability to realize further study and comprehension • Cause more stress
Stoller [24]	2021	America	SWOT analysis	<ul style="list-style-type: none"> • Enhance teamwork, participation, and communication 	<ul style="list-style-type: none"> • Family distractions • Loss of spontaneous interaction • Increased demand for learning devices • Lack of in-person interaction
Fan et al. [25]	2021	China	Review	<ul style="list-style-type: none"> • No mentioned 	<ul style="list-style-type: none"> • Visual dysfunction
Tan et al. [27]	2022	China	Cross-sectional	<ul style="list-style-type: none"> • No need to adapt to a new environment • Fewer social fears • Provide tools to tackle language obstacles 	<ul style="list-style-type: none"> • Disorders of daily life caused by jet lag • Failure to feel the campus atmosphere of studying abroad