



Free online dermatology course for medical trainees in Ethiopia: A pilot study

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Background: The effectiveness of virtual dermatology curricula in developing countries remains unclear despite an urgent need due to the pandemic and other factors.

Objective: To compare a virtual dermatology curriculum deployed in Gondar, Ethiopia with a traditional in-person course.

Methods: We developed a free, on-line dermatology course. 104 trainees from the University of Gondar, Ethiopia, completed the course. Pre- and post-course surveys measuring self-reported proficiency were administered. End-of-Course surveys were distributed to elicit feedback on the course. Performance on final examinations was compared to a historical control group, which did not participate in the course but received standard in-person training.

Results: Compared to historical controls ($n = 236$), the pilot cohort ($n = 104$) averaged over 4 points higher on the final exam ($P < .0001$). Most participants were satisfied with all aspects of the on-line course and desire at least a component of virtual learning in the future.

Limitations: This pilot study was performed at a single institution, and the participants were not randomized. Further studies in demographically diverse cohorts are needed to validate the results.

Conclusion: This dermatology curriculum is a free, innovative platform that can be adapted for dermatology trainees in resource-limited settings. (JAAD Int 2022;6:20-6.)

Key words: global health; international dermatology education; virtual curriculum.

INTRODUCTION

With limited educational resources in many developing countries and the global COVID-19 pandemic, virtual courses have become a new focus in global health.¹ The recent initiatives include an international virtual grand rounds curriculum being developed from teledermatology cases in Kabul, Afghanistan.² Likewise, a modular training program conducted by US dermatologists for family medicine residents in Somalia was found to help significantly

increase proficiency in core concepts outlined by the American Academy of Dermatology basic dermatology curriculum.³ However, very limited research has assessed the effectiveness of these curricula on medical trainees. Because of reliance on virtual learning during the pandemic, more dermatology residency programs in the United States used virtual learning techniques to advance dermatology education according to student learning preferences.⁴

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Specialties outside of dermatology have demonstrated adaptability in incorporating digital teaching delivery methods on a larger scale to share expertise with medical students and residents worldwide.⁵ However, the capacity for virtual global health programs to augment education for dermatology trainees at institutions in developing countries remains unclear.

We developed the course Essentials of Dermatology for Frontline Practitioners in order to accommodate an immediate need for virtual instructions for medical trainees in Ethiopia, where the pandemic, political unrest, and limited dermatology faculty limit traditional dermatology instructions. We hypothesized that a virtual dermatology learning platform would provide Ethiopian students with an opportunity to learn dermatologic knowledge and skills in a manner similar to learning using traditional in-person courses. Our study aimed to measure the ability of this course to enhance knowledge and clinical skills in dermatology among a pilot cohort of 104 dermatology trainees from the University of Gondar, Ethiopia. We also sought to determine whether the course aligned with student learning preferences and allowed for similar performance on a university-administered final examination compared with historical controls.

METHODS

The study (STUDY00002765) was reviewed by the Emory University School of Medicine institutional review board and exempted from further review. Essentials of Dermatology is a free virtual dermatology course for medical students and other trainees in developing countries. It is a part of the broader initiative “Dermatology Global,”⁶ an education website with dermatology learning tools such as virtual courses and clinical atlases. The course directors, dermatologists at Emory University (Drs Bilcha and Stoff), created the course content using Adobe Captivate and Learning Management System platforms. The interactive webpage design captures all data from Adobe Captivate and features audio lectures using PowerPoint presentations and clinical images (Fig 1). Accessing the course content requires a brief registration, which can be done from smartphones or tablets.

Designed to be adapted to dermatology curricula in developing countries, the course is divided into 10 modules, each module consisting of 2 lecture hours. The course was administered to students at the University of Gondar ($n = 104$) in collaboration with the dermatology faculty at Gondar (Dr Befekadu). Prior to beginning the course, the students completed a precourse survey measuring self-reported proficiency with core concepts in dermatology on a scale of 1-10 (Table 1). Upon completion of each course module, representative questions were presented to students in the form of a quiz, the responses to which were recorded. After completing the course, a final examination was generated by the course.

This examination is independent of the official examination administered by the University of Gondar. A certificate was awarded upon successful completion of the course. The participants also completed a postcourse survey, identical to the precourse survey. Data from the surveys were analyzed to calculate the means of the responses to each survey question. The presurvey and postsurvey data were then compared using paired t tests.

After that, an end-of-course pencil-and-paper survey (Supplementary Material, available via Mendeley at <https://doi.org/10.17632/fbftmm23rh.1>) was administered to the students ($n = 102$) to elicit feedback about the overall perceptions on the quality and usefulness of the course (Figs 2 and 3). At the time of the final examinations at the University of Gondar, the performance of this student cohort ($n = 104$) was compared with that of a historical control group of students who did not participate in the Essentials of Dermatology course but received standard in-person training at Gondar. The curriculum for this control group consisted of traditional lectures covering the same core content as the online curriculum presented by the dermatology faculty. These lectures were accompanied by visual images to illustrate concepts and disease pathology. The participants of the Essentials of Dermatology course did not attend the university lectures; likewise, those who attended university lectures did not enroll in the virtual course. Both the groups had equal access to supplementary textbook materials and online journal articles. Final examination scores for both the groups were

CAPSULE SUMMARY

- A free, online dermatology course was created to accommodate a need for virtual instructions in Ethiopia, where the COVID-19 pandemic and political unrest limit traditional instructions.
- Compared with traditional instructions, the course led to better examination performance and can be adapted for other resource-limited settings.

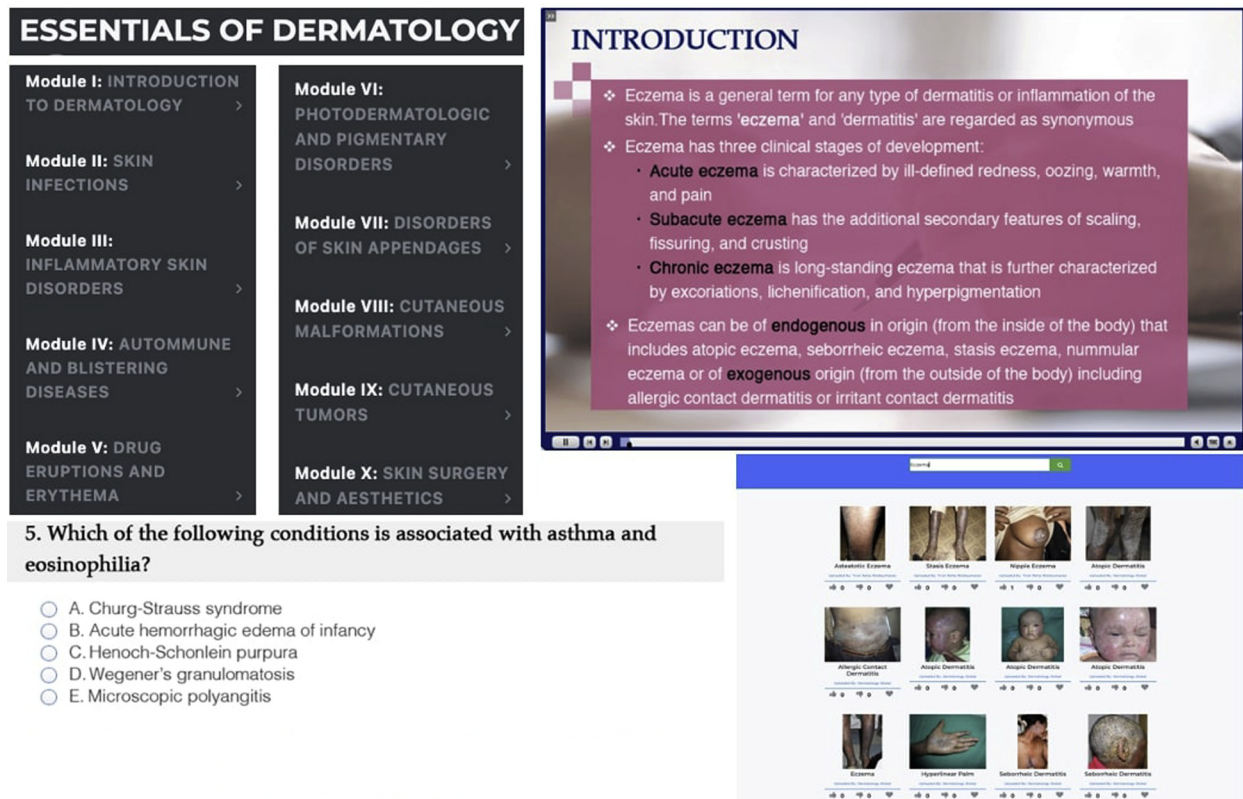


Fig 1. Examples of the educational content of the Essentials of Dermatology course.

compared using the independent sample *t* test. All the statistical analyses were performed using Stata IC 15.0 (StataCorp), with $P < .05$ in 2-sided tests considered significant.

RESULTS

In total, 104 students from the University of Gondar participated in the Essentials of Dermatology course. All were medical students in their final year with no prior experience in dermatology. For each pretest and posttest survey question, means and SDs were calculated (Table 1). On average, each posttest mean was 2.56 points higher than the corresponding pretest mean.

Of the 104 students who completed the Essentials of Dermatology course, 102 also completed the end-of-course survey (98% response rate) (Supplementary Material). As indicated in Fig 2, approximately 98% of the students either “agreed” or “strongly agreed” that the course enhanced their knowledge about skin disease. Similarly, approximately 92% “agreed” or “strongly agreed” that the course helped them improve their ability to diagnose and treat skin disease.

Additionally, as part of the end-of-course survey, the students ($n = 102$) indicated their satisfaction

levels regarding their overall experience of interacting with the course modules (Fig 3). In particular, the students indicated the highest levels of “satisfaction” or “complete satisfaction” for the following categories: educational content within the modules (92%), number of modules (86%), and overall experience with the online format (76%). The students expressed lower levels of “satisfaction” and “complete satisfaction” regarding ease of use with cell-phone or computer devices (60%). Although only 3% of students experienced “complete dissatisfaction,” an additional 19% were somewhat “dissatisfied.”

When asked whether this course should become a part of the curriculum at the University of Gondar for future students, 87 (85%) students answered “yes” and 15 (15%) students answered “no.” When asked to rate how likely they would be to recommend this course to other students or trainees on a scale of 1 (unlikely) to 10 (very likely), the mean of 102 ratings was 8.3 (1.8).

Finally, the performance of all the students completing the final examination administered by the University of Gondar was recorded ($n = 340$). In comparison with students who did not take the Essentials of Dermatology course ($n = 236$), students who completed the online course ($n = 104$) averaged

Table 1. Pretest and posttest survey results assessing the comfort and skill levels of students completing the Essentials of Dermatology course ($n = 104$)

Question	Pretest and posttest questions	Pretest mean (SD) (Scale: 1-10)	Posttest mean (SD) (Scale: 1-10)	P value
1	Comfort level describing skin lesions using common terminologies	6.03 (2.45)	8.17 (1.91)	<.0001
2	Knowledge of topical and systemic medications used to treat infections	6.10 (2.43)	8.10 (1.87)	<.0001
3	Ability to differentiate clinical features of inflammatory disorders	5.26 (2.24)	7.83 (1.87)	<.0001
4	Ability to discern skin lupus and potential associations to systemic lupus erythematosus	5.75 (2.50)	7.80 (1.90)	<.0001
5	Ability to differentiate signs and symptoms of serious versus nonserious drug reactions	4.96 (2.24)	7.64 (1.91)	<.0001
6	Naming common skin disorders that are worsened or caused by sunlight	5.11 (2.33)	7.92 (1.82)	<.0001
7	Managing acne vulgaris based on severity (mild, moderate, or severe)	4.14 (2.35)	7.79 (1.89)	<.0001
8	Understanding common congenital skin malformations and possible visceral organ involvement	4.50 (1.91)	6.92 (2.33)	<.0001
9	Ability to differentiate the features of skin malignancies from infectious conditions and benign tumors	4.83 (1.82)	7.54 (2.35)	<.0001
10	Ability to perform small skin surgeries with proper antisepsis and local anesthesia	2.92 (1.89)	5.43 (2.53)	<.0001

over 4 points higher on the university final examination (76.4 vs 72.0, respectively, $P < .0001$).

DISCUSSION

In the past, virtual dermatology curricula have led to improvements in clinical skills such as dermoscopy.⁷ Recently, all third-year and fourth-year students who completed a 4-week online curriculum for a dermatology rotation instead of in-person clinical experience at the Medical College of Wisconsin either “strongly agreed” or “agreed” that the course improved their clinical knowledge in dermatology.⁸ Notably, the American Academy of Dermatology introduced a standardized, online curriculum for a fourth-year dermatology clerkship, which was evaluated by a study as contributing to significant knowledge improvement in 100% of participants.⁹

The Essentials of Dermatology course showed the effectiveness of a virtual learning platform in an international setting. This course received overwhelmingly positive satisfaction ratings from students regarding its effectiveness in enhancing

knowledge and clinical skills in diagnosing and treating skin disease (Figs 2 and 3). In addition to subjective responses, objective measurements also revealed the educational value of the course. Students who completed the Essentials of Dermatology course scored, on average, 4.32 points higher on the final examinations administered by the University of Gondar than their peers who did not take the online course.

We found that the course supported student learning needs based on the fact that 90% of the students reported a preference for either all-online or a mixture of online and in-person learning in the future. The students used a variety of electronic devices, with 43% using only a laptop or desktop, 18% using only a cellphone, and 26% using a combination of a laptop or desktop and either a cellphone and/or a tablet (Fig 4). Therefore, we reason that the flexibility afforded by this virtual platform in accessing educational content using multiple devices contributed to the overall effectiveness. Additionally, high satisfaction ratings for the audio, video, and educational content in module

STUDENT INSIGHT ON THE EFFECTIVENESS OF THE ESSENTIALS IN DERMATOLOGY COURSE

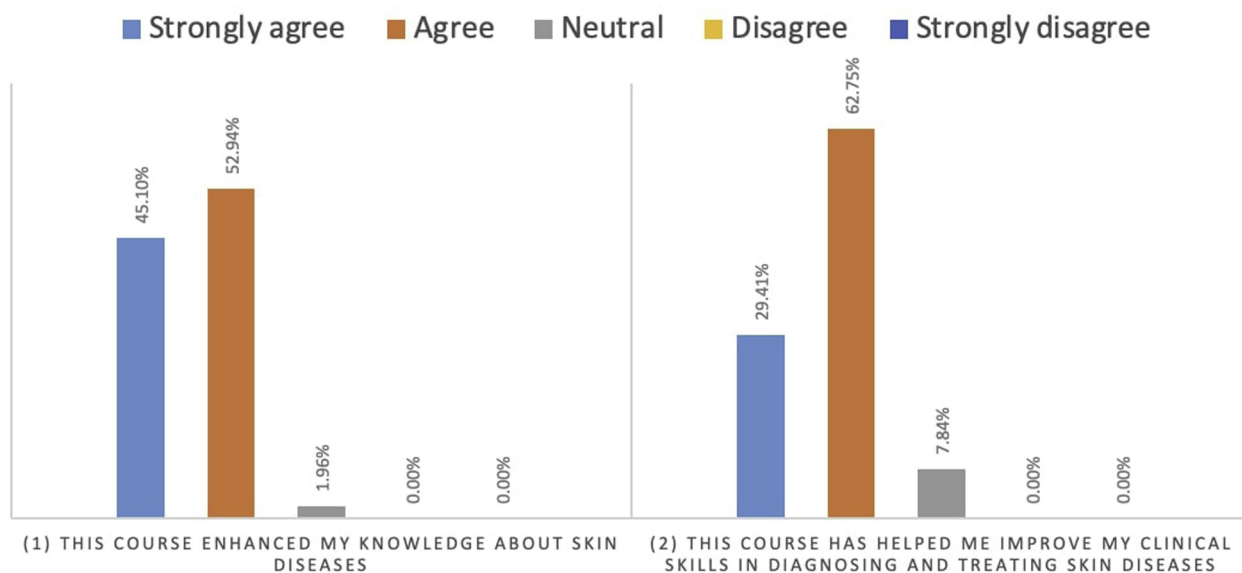


Fig 2. Responses of 102 students to the first 2 questions of the end-of-course survey.

STUDENT SATISFACTION RATINGS WITH ESSENTIALS OF DERMATOLOGY COURSE (N = 102)

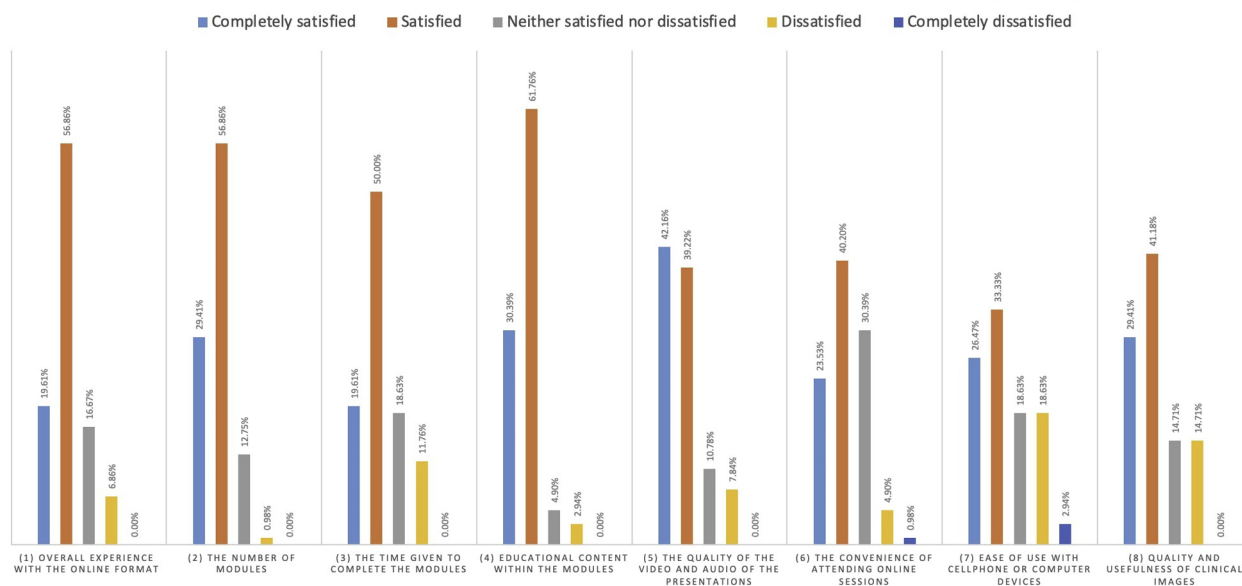


Fig 3. Upon completion of the Essentials of Dermatology course, all students ($n = 102$) completed a postcourse survey. As part of the survey, they indicated their satisfaction levels regarding their experience with various aspects of the course.

presentations provide additional support for future initiatives to use similar platforms in designing virtual dermatology curricula.

Although most students expressed either “complete satisfaction” or “satisfaction,” approximately

one-fifth of the students reported a level of dissatisfaction with the ease of use with cellphone or computer devices (Fig 4). Among the students who were “dissatisfied” or “completely dissatisfied,” 5 used only a cellphone, 4 used a laptop or desktop or

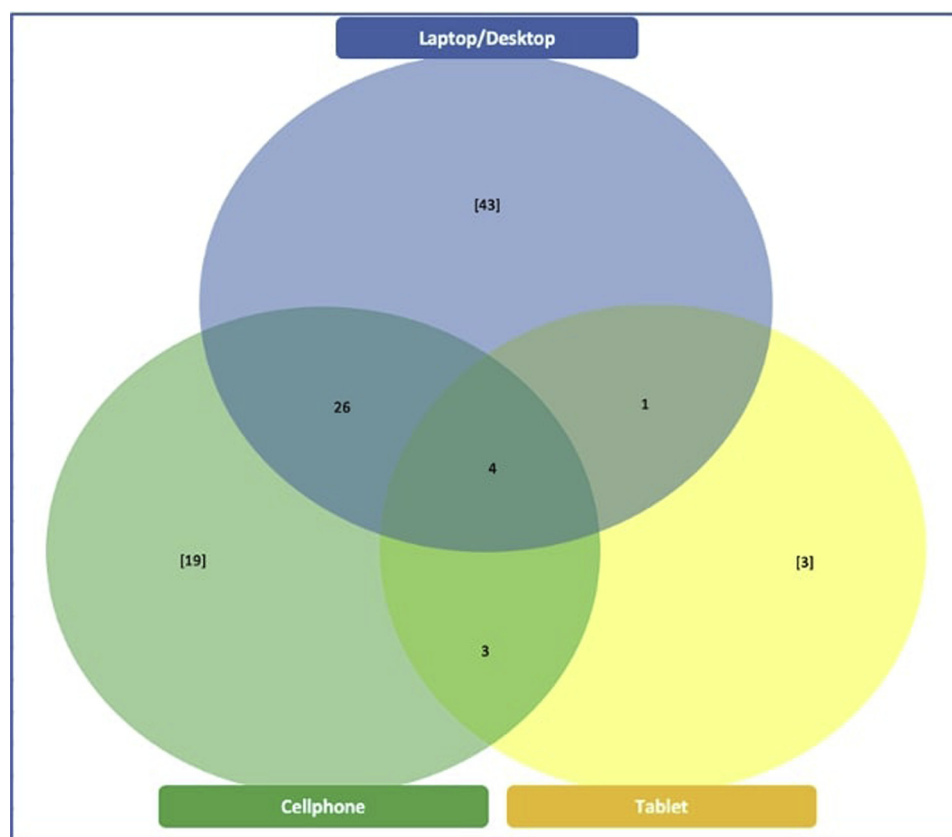


Fig 4. Devices used by students ($n = 101$) for completing the Essentials of Dermatology course modules.

a cellphone, and 12 used only a laptop or desktop. This range of devices used indicates that the source of dissatisfaction was not necessarily due to the limitations of a particular device to accommodate the online experience. Likewise, among the students who were “dissatisfied” or “completely dissatisfied” with the ease of use with cellphone or computer devices, 2 students indicated a preference for all-online lectures, 2 for all in-person lectures, and 17 for a mixture of both. Once again, this even spread did not allow for further insight into why approximately a fifth of the students reported a level of dissatisfaction with the ease of use with cellphone or computer devices. Future research based on these findings may seek to investigate dissatisfied participants more closely to determine how the course could be modified to better address student learning needs.

The potential applications of these results are broad, given that any individual may register and enroll in the course free of charge. Furthermore, international dermatology training programs can coordinate with course directors to arrange for cohorts of students to engage in virtual platforms.

LIMITATIONS

A randomized controlled trial was not performed because a concurrent in-person control group was not possible during the pandemic. This pilot study was performed at a single institution. Further studies in demographically diverse cohorts are needed to validate the results. More clinical images are needed to comprehensively supplement the PowerPoint presentations and audio lectures. More flexibility within the virtual platform, such as variable speed playback and download options for offline access, would likely improve user satisfaction. Additionally, the content may not meet the needs of all trainees, whose learning styles and knowledge bases may differ.

CONCLUSION

This pilot dermatology curriculum represents an innovative platform for international dermatology trainees. The participants were generally satisfied with the course, which enhanced their knowledge and skills, and outperformed those who had taken a similar course in person in the final examination. This free course can be adapted to meet the needs of other trainees in resource-limited settings.

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Conflicts of interest

None disclosed.

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