Research Application Summary

Agriculture MOOCs to enhance lifelong learning in Higher Education Institutions and food security in developing countries: Perceptions from the learners

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Abstract

While agriculture professionals, researchers, students among other people are continually seeking to increase their knowledge and skills, AgMOOCs offer good opportunity to fill this gap. The overall objective of this study was to analyse feedbacks from the learners of AgMOOCs offered by the Commonwealth of Learning between 2015-2020. The study considered a total of 27 courses, offered in 10 phases, with over 50,000 active participants from 121 developing countries. An evaluation form was filled by a total of 11,779 learners. Quantitative data were analysed with the help of percentages and frequencies, while qualitative data were analysed by grouping the responses according to thematic content. The respondents highly appreciated the courses, considered the materials to be of good quality, the instructors knowledgeable, and the course platform easy to access and navigate. The respondents provide useful suggestions to improve learning experience and a subsequent positive impact on food security in developing countries.

Keywords: MOOC, online learning, teaching

Résumé

Alors que les professionnels de l'agriculture, les chercheurs, les étudiants entre autres cherchent continuellement à accroître leurs connaissances et leurs compétences, les AgMOOC offrent une bonne opportunité de combler cette lacune. L'objectif global de cette étude était d'analyser les commentaires des apprenants des AgMOOC proposés par le Commonwealth of Learning entre 2015-2020. L'étude a porté sur un total de 27 cours, proposés en 10 phases, avec plus de 50 000 participants actifs de 121 pays en développement. Un formulaire d'évaluation a été rempli par un total de 11 779 apprenants. Les données quantitatives ont été analysées à l'aide de pourcentages et de fréquences, tandis que les données qualitatives ont été analysées en regroupant les réponses selon le contenu thématique. Les répondants ont beaucoup apprécié les cours, ont considéré que le matériel était de bonne qualité, les instructeurs compétents et la plate-forme de cours facile d'accès et de navigation. Les répondants fournissent des suggestions utiles pour améliorer l'expérience d'apprentissage et un impact positif ultérieur sur la sécurité alimentaire dans les pays en développement.

Mots clés: MOOC, apprentissage en ligne, enseignement

Introduction

Education, learning, and acquisition of knowledge and skills have never been of more central importance than they are today (Nyerere *et al*., 2012). Agriculture professionals, researchers, students and other people try to increase their knowledge with lifelong education but at the same time, they have less time to allocate because of the intensive requirements in their jobs (Kazanidis *et al*., 2018). The COVID-19 pandemic has further underlined the limitation of conventional teaching and learning whilst highlighting the importance of online teaching and learning. As a result of the pandemic, many institutions in Sub-Saharan Africa (SSA) have suffered partial close-downs and the normal pre-COVID-19 state of affairs is likely to take a long time to be realized if ever at all. This has further worsened the situation affecting rapid skilling of students, employed professionals as well as aspiring farmers (RUFORUM, 2021).

Massive Open Online Courses (MOOCs) are a new occurrence in the area of asynchronous learning, seen as 'disruptive innovation' in higher education. MOOCs have the potential to provide cutting edge courses that could drive down the cost of university-level education and potentially disrupt the existing models of higher education (Yuan and Powell, 2013). In particular, AgMOOCs is an online platform designed to help students, professionals and organizations to acquire and enhance knowledge and skills in the agriculture domain. The platform provides free access to numerous high quality courses online offered by renowned faculty from the premier institutions (Mishra, 2016). Emerging technologies such as AgMOOCs have potential implications for the future of agriculture (UNCTAD, 2017), when agriculture professionals receive such high quality training Extension service delivery among other services, are then likely to have positive impact on food security in developing countries.

The AgMOOCs project. The Agriculture Massive Open Online Courses (AgMOOCs) project has been implemented by the Commonwealth of Learning (COL) and her partners since 2015. AgMOOCs is an online platform designed to help students, professionals and organisations to acquire and enhance knowledge and skills in the agriculture domain. The platform provides free access to numerous high quality courses online, to learners at the level of advanced undergraduate students, faculty, extension practitioners, and researchers. The courses last between 5-8 weeks each. By the end of June, 2020, 27 AgMOOCs had so far been offered to a total of over 50,000 learners. Through her programme of Lifelong Learning for Farmers (L3F), COL used the experiences to keep the doors of learning open during the first phase of the COVID-19 lockdown (April-June, 2020). During that period, COL's three AgMOOCs attracted nearly 32,000 learners, the majority from poor social and economic backgrounds (RUFORUM, 2021). Significant experiences and lessons have hence been generated from deployment of ideas and practices.

An independent analysis of the feedbacks from the participants in phases 1-10 (2015-2020) was undertaken. Each course had a set of feedback data on multiple choice questions and open-ended questions. The purpose of this analysis was to gain a deeper understanding of the perceptions of learners through an in-depth analysis of their feedback. The analysis specifically provides insights regarding the learners' feedback on the AgMOOC content, instructors' knowledge, the platform, participants and establishes the results of their learning from the AgMOOCs. This was aimed at building capacity for effective online facilitation and to improve course delivery for future learners, while retaining those already engaged. It may also be useful to individuals and Higher

Education Institutions (HEIs) who may wish to participate as course developers, instructors, and even learners. Besides, extension service delivery is likely to be enhanced when courses are tailored to meet the needs of extension workers to address food security in developing countries.

Methodology

This study considered courses that were offered in 10 phases between 2015-2020. During this period, a total of 27 courses were offered to about 50,000 registered learners in 121 countries. After each course, the learners were invited to fill an evaluation form, to share their perspectives about the course they had attended. At the end of each course, a questionnaire was sent via electronic mail to all the users of the AgMOOCs. Their responses were grouped into Part A (responses to multiple choice/rating questions), and Part B (responses to open-ended questions). There were a total of 11,779 respondents of the evaluation forms during the study period, and it is their responses that are used for this analysis. The learners provided personal information feedback on aspects such as their age, sex, whether they were student or members of faculty, and others. The learners also provided feedback on the platform; its features and ease of access. They also provided feedback on the course that they attended. A number of questions were asked to the learners, aimed at finding their views about the courses that were offered. The questions sought to find out whether the course materials were of good quality, the pace of the course was confortable for learning, whether course management met the learning objectives and whether the learners were satisfied with the content.

The learners' responses were summarized and provided for further analysis. These data were accessed from https://www.agmoocs.in/feedbacks, and reports of selected course evaluations that were done during the same period. The quantitative data from Part A of the questionnaire were analysed with the help of statistical tools in terms of percentages and frequencies, while the qualitative data from the open ended questions were analysed by grouping the responses according to thematic content.

Results and Discussion

Registrations on the learning platform and active users. The total registrations on the platform ranged from a minimum of 1,901 in 2015 to a maximum of 16,566 in 2019. There was a gradual increment in both total registrations and actual active users over the years, especially between phase 3 (2017) and phase 6 (2018). However, there was a wide gap between the two (TR and AU) especially in the early phases 2 and 3 (Fig.1). In phase 2 (2016) 47% of the total registrations were active users, while in phase 3 (2017), only 35% of the TRs were active users. In phase 8 (2019) however, 83% of total registrations turned out to be active users. That a wide gap between the two (TR and AU) could exist should not be surprising for MOOCs in general. Learners in MOOCs have been found to select contents of a MOOC in which they are interested, and then drop out once they have completed them (Kopp and Ebner, 2017). They opt not to study the entire course. This is especially true for professionals who are seeking to deepen their knowledge in certain areas that are being offered in a given course. Other reasons that were found in literature to contribute to this gap include lack of time for learners to actively participate, lack of learners' motivation, insufficient background and skills to study online, and hidden costs among other things (Khalil and Ebner, 2014).
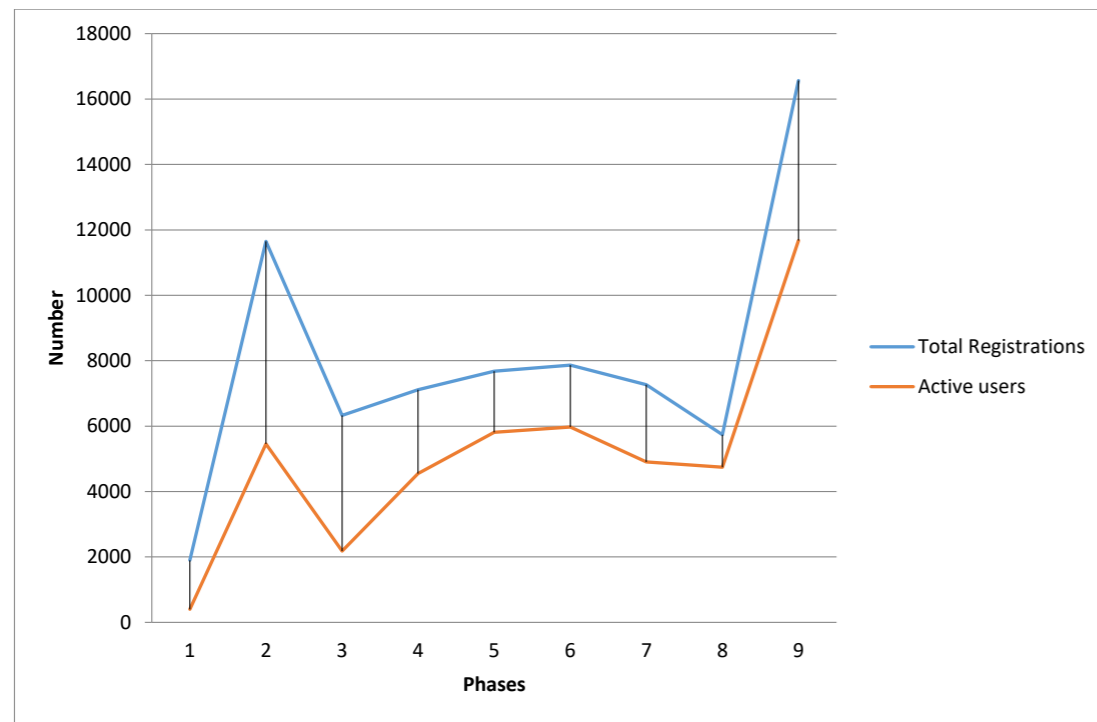
Figure 1. Total registrations and active users in COL online platform

Figure 2. Gender of the learners

Figure 3. The gap between female and male participation in phases 8 and 10

Personal information feedbacks. On average over 65% of the learners were male, and this proportion gently rose over the years. While fewer females consistently attended the AgMOOCs between 2015- 2020, the highest percentage of female learners was 38.4% in phase 10, and the lowest was 15% in phase 8 in 2019 (Figures 2 and 3). The gap between the numbers of male and female learners was wide although it seemed to be closing in phase 10.   It is important toestablish how more female learners could be motivated to participate in learning using the AgMOOCs. In all the phases, the learners were youth aged between 17-34 years. In phases 2,3,4, and 8, close to 39% were aged between 25-34 years, and were the majority, while in phases 5,6 and 7, the majority, also 39%, were aged between 17-24 years. In phase 10, 53.5% of the respondents were aged between 17-24 years, and the gap between female and male participants was also narrowest in phase 10, where the learners were relatively more youthful (Fig. 2 and 3). Younger women might be more predisposed to attend the AgMOOCs as was the case in phase 10 where the majority of the respondents (53.4%) were aged between 17-24 years, and the percentage of women participating in this phase was the highest at 39%. However, Nyerere and Gravenirand (2012) and Sonawane, (2020) allude to family commitments as a major factor that hinders older women's participation in MOOCs albeit in a personalized environment.

The learners reported to have known about the course they attended, mostly from their friends and colleagues (>50%). Over 35% reported to have got information about the course through an e-mail from AgMOOCs. The learners were asked who they were; either a student in an Agricultural/ Veterinary College, or University, or Faculty. In all the phases, over 50% of the learners were students, while on average 22% were members of faculty (Figure 4). Close to 70% of the learners accessed the course they attended, from home, while another 30% attended from their place of work.
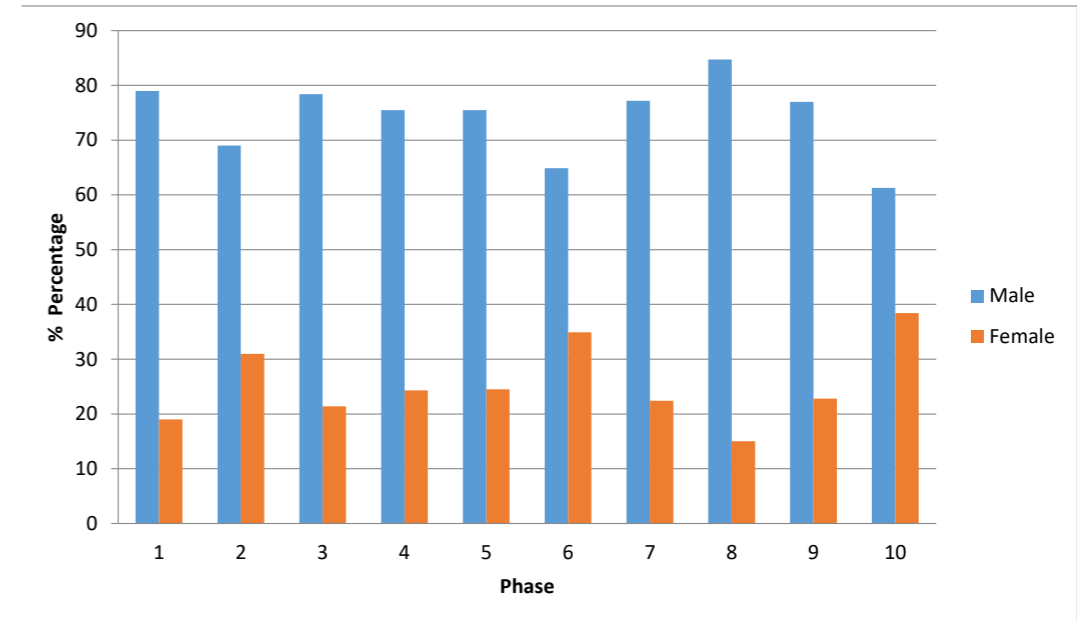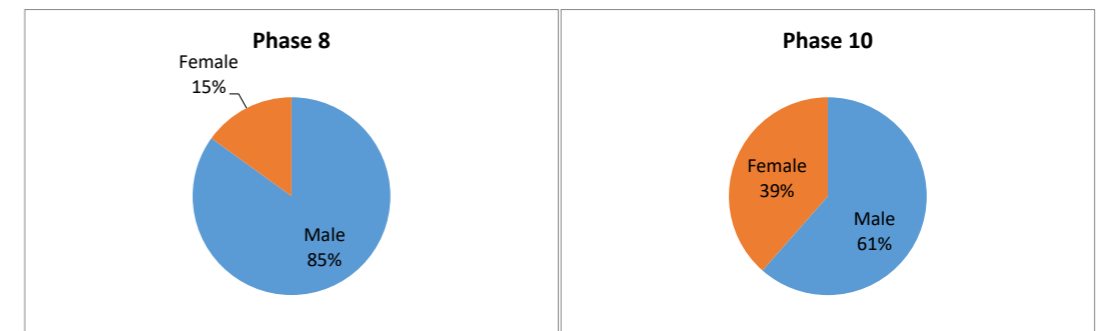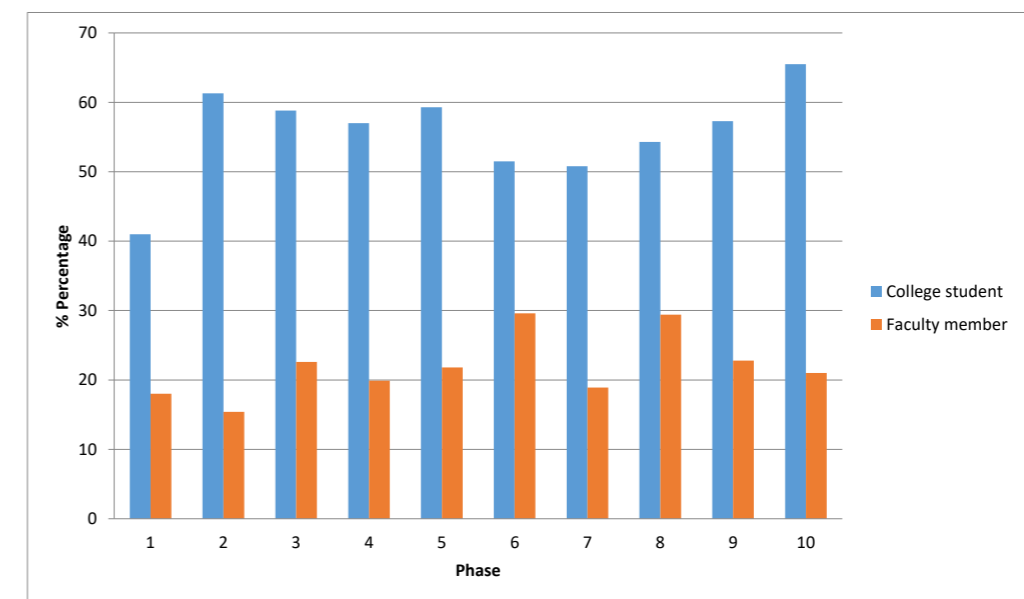

Figure 4.   Learner affiliation

Course Feedback. The 27 AgMOOCs that were offered between 2015-2020 in ten (10) different phases are shown in Table 1 below. These include 19 courses that were uniquely offered, and 8 re-runs.

The learners were asked their views about the courses that were offered, the quality of course materials, whether the pace was confortable for learning, and whether course management met the learning objectives, among others. Figure 5 shows the combined responses to these and more questions across the different courses and phases.

Table 1. AgMOOCs offered between 2015-2020

Phase	Year/Month offered	Course(s)
1	2015	ICT Basics
2	2016 (March)	Integrated Pest Management (IPM); Nutrition, Therapeutics and Health (NTH); Weather Forecast in Agriculture and Agro-Advisory; Fundamentals of Agricultural Extension
3	2017 (March)	Integrated Pest Management (IPM); Agricultural Value Chain Management; Basics of Entrepreneurship Development in Agriculture (BEDA)
4	2017 (September)	Organic Farming; NTH; BEDA;
5	2018 (February)	Fundamentals of Agricultural Extension; Integrated Disease Management (IDM)
6	2018 (November)	Fundamentals of Agricultural Extension; Integrated Disease Management (IDM)
7(1)	2019 (January)	Resource Management in Rainfed Drylands; Fundamentals of Agricultural Extension
7(2)	2019 (June)	Employment Generation among Rural Youth through Agripreneurship
8	2019 (October)	e-Extension; DDM; Design Thinking for Agricultural Implements (DTAI)
9	2020 (Feb)	Conservation Agriculture-based Sustainable Intensification; Diagnosis of Crop and Stored Grain Pests and their Management
10	2020 (July)	Fundamentals of Agricultural Extension; Integrated Pest Management; Employment Generation among Rural Youth through Agripreneurship
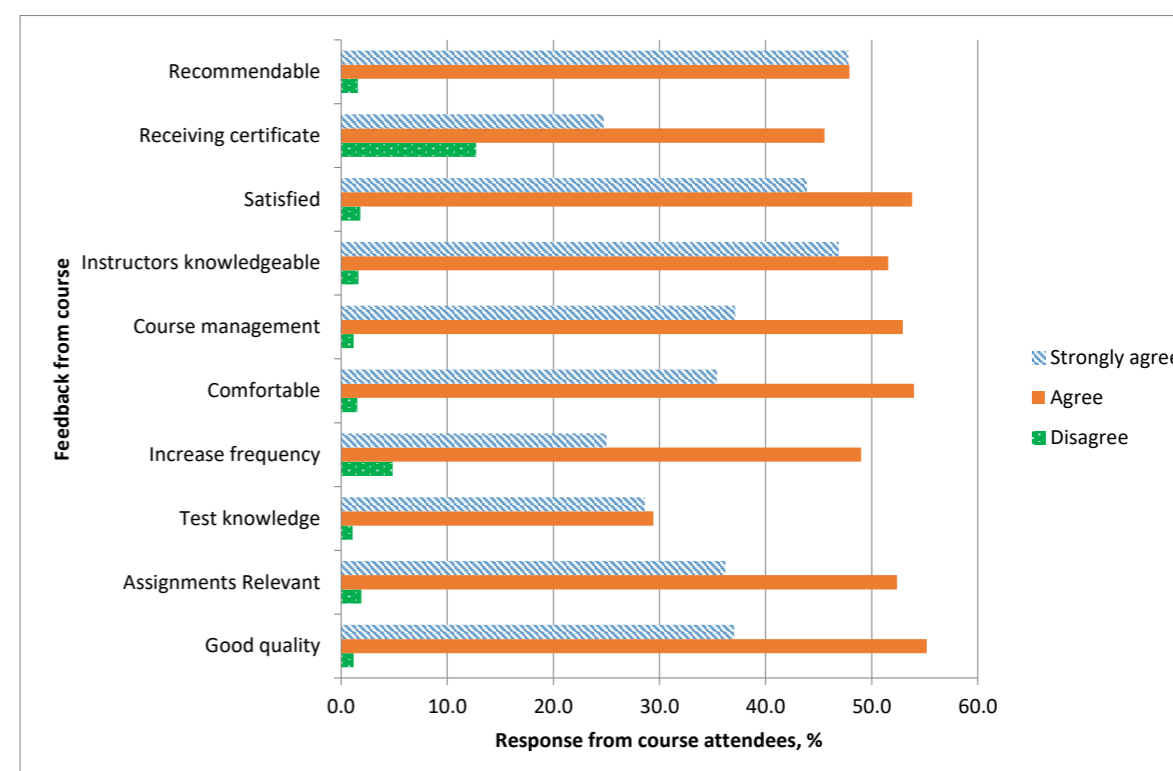
Figure 5. Combined course feedbacks across the phases and courses between 2015-2020

Overall the respondents seem to have appreciated the courses. The best attributes of the AgMOOCs, based on the responses were good quality materials, course management, a comfortable pace and instructors with good knowledge. Ninety percent (90%) of the respondents agreed that course management met the learning objectives, and 92.2% agreed that the course materials were of good quality. Ninety seven percent (97%) agreed that the instructors had good knowledge respective subjects, and a similar percentage was also satisfied with the course content. However, a few sentiments were exceptionally noticeable. In phase 2, the respondents more strongly agreed to these positive attributes than simply agree. In phase one, all the respondents (100%) agreed that the instructors had good knowledge of the subject. The respondents indicated that they were satisfied with the courses and would recommend them to others. The courses and content were overall well appreciated by the respondents.

Equally noticeable was the fact that the number of respondents who disagreed on any one of the tested attributes was insignificant. For example in Phase 8, no respondent disagreed on most of the attributes except the issuing of certificates. A question was asked whether one would have taken the course if no certificate was being offered at the end of the course. Across all the phases, it is clear that although a good number (>60%) would have taken the respective courses even without a certificate being offered, this question attracted the largest number of respondents (on average 12.7%) who disagreed. Offering a certificate at the end of an AgMOOC is therefore an important motivational factor for learners to attend the course.

The usefulness of the platform to the learners. For effective learning, the course platform should be easy to access, as well as easy to navigate. Platform accessibility relates to a learner's ability

to access the platform on different ICTs such as laptops, and smart phones (Mishra, 2016).The learners rated, on a scale of 1-5, the ease to access and navigate the learning platform.The average rating for both, and across the phases was 4.5. This shows that the learners found the platform both easy to access and to navigate. On average 75% of the respondents gave a score of 5, and 27% gave a score of 4 to the ease of platform use (Figure 6).
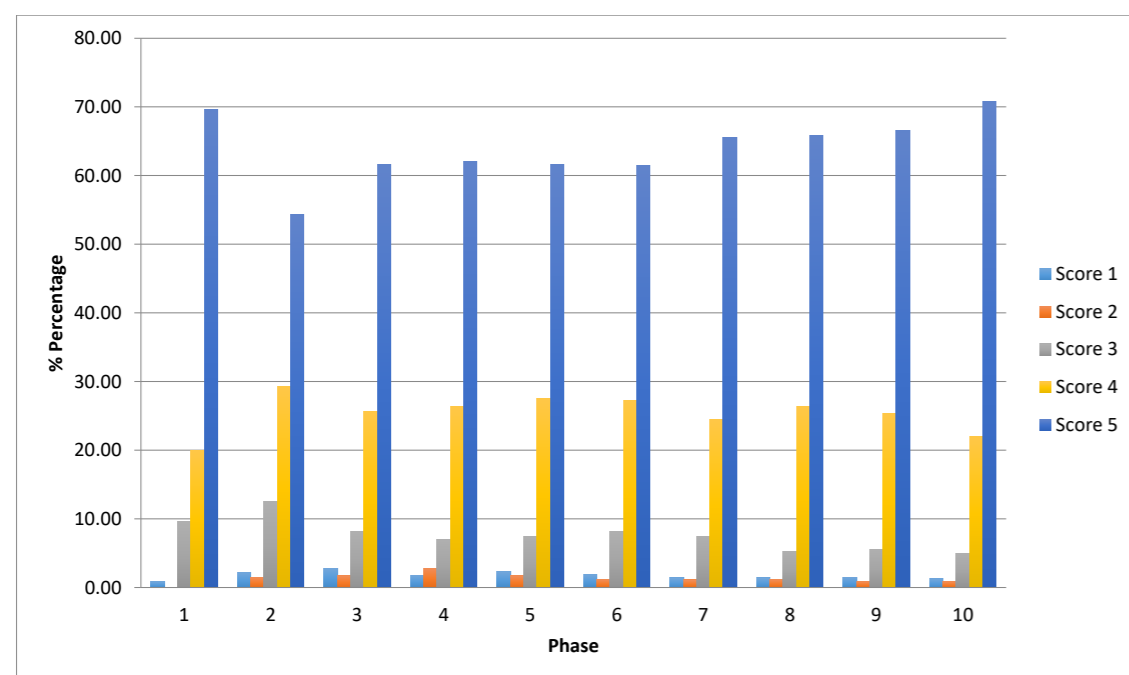

Figure 6. Ease of platform use by the learners

The learners mainly used two options to access content from the platform; videos and PDFs and 86.2% indicated to have used videos while 72.4% indicated having used PDFs. Those who used videos watched them on the platform itself, although beginning with Phase 5 (2018) an average of 34.6% were using the AgMOOCs App. For those who used the App, over 50% found it easy to use, with an average rating of 4.3. Over 90% of those who used the App used Android App for AgMOOCs. The rest who did not use the App had issues; some were not aware that it existed; others did not know how to use it, while a few failed to download it. A few learners observed that the App was not regularly updated and therefore preferred to access the course from the website. Considering that more learners were trying out the App (about 61% used it in phase 10), it would be essential to address the issues raised in order to facilitate course access to those who prefer to use it.

From the responses to the open-ended questions, 85% of the respondents expressed satisfaction with the platform and its features. There were two ways of accessing the courses on the AgMOOC platform. First, a learner would register through a link that was provided in their e-mail, and when they login, the course would be accessed from the AgMOOC site. Secondly, there was an option of downloading and using the AgMOOCs App. Further, 55% commented on the technical aspects of the platform and gave the following comments.

(i) The AgMOOC site was very convenient to use where one had a stable and reliable internet

connection. Between phases 1 and 4, over 80% of the respondents accessed the AgMOOCs form the AgMOOC site, using a computer (either a laptop or a desktop), and over 90 % of them were working either from home or office. From phase 5 onwards (2018-2020) more and more learners were using the AgMOOC App. (56.8% in 2018 to 72.5% in 2020).

(ii) The AgMOOC App: While the AgMOOC site was more convenient to use, the App was found not to be reliable by the users. It would not be updated with the relevant content in time for the upcoming session, and some content would be missing altogether.

(iii) Course materials were available in audio, video and pdf formats. However, these were not downloadable. Learners wished to download the materials so as to use them at a later time when they are offline. The videos in particular lasted 8-10 minutes each, which consumed a lot of data and increasing the cost of access for the learner.

(iv) Study time/Duration of the course: These materials were found to be very useful to the learners but the time to use them for self-study was limited, considering that they would not be downloaded. As such the respondents felt the time given to access the materials, study them and attempt the quizzes should be increased.

(v) The chat room was not that interactive. It had very limited room for discussion. When learners posted a question, they sometimes did not get a response. This was perhaps because some courses were facilitated by one person, and the learners were too many for one person to attend to all the questions. Other suggestions included; sharing the PDFs with the learners on mail, regular updates of the progress of the course on mail, and certificates to be sent to learners individually on their e-mails.

(vi) Other changes; A few other changes were proposed by about 10% of the respondents. They proposed that the platform should allow for mass discussions, teacher-learner interaction especially for teachers to provide answers to questions, and more case studies on practical field experiences. Overall, 63% of the respondents commented on the videos on the platform. The comments included; suggestions to increase the number of videos, more case studies of practical field experiences, and a video gallery to facilitate identification of insect pests, and insect affected crops.

All the above perceptions of the learners concerning the technical aspects of the platform relate very well with the observations of Khalil and Ebner (2014) on the reasons why MOOC learners would drop out of a course. In particular, Khalil and Ebner (2014) allude to lack of time and learners' motivation, lack of interactivity, and hidden costs. They confirm the importance of interaction and communication in MOOCs as learners construct their own knowledge, develop their own ideas, express themselves, establish a presence, make thoughtful long-term relationships, without which learners would lose their focus (Khalil and Ebner, 2014). The cost of accessing videos and other materials only on the platform, without the possibility of downloading them for later use carries a hidden cost to the learner. The respondents therefore expressed a wish to download the materials in order to save on the cost of data for internet connections.

The results of learning from the AgMOOCs. The results of learning from the AgMOOCs were analysed from the responses about who were interested in sharing their new knowledge. The willingness to share the knowledge was taken to be a result of one having learnt from the course. In the first place, the respondents were asked what their expectation was in attending the course. An average of 54% of the respondents were students from an Agriculture College or university, while another 22% were faculty members. An average of 66% expected to increase their knowledge and awareness from the courses they attended. After the course, an average of 46% were willing to share with friends and colleagues, while 25% were willing to share with students. Therefore, an

average of 71% were willing to share their knowledge, an indication that they had acquired new knowledge that they could share.

The results of learning from the AgMOOCs were also analysed using the number of active users of the platform who obtained a certificate from the course they attended. Two types of certificates were awarded; either a competence (CC) or participation certificate (PC). In order to be awarded a PC, a learner had to obtain at least 40% marks in one quiz. Overall, a total of 18,571 certificates were awarded to AgMOOC learners between 2015-2020. This was 25.6% of total enrolment (72,463) in all the 25 courses offered during this period. On average 41% of the Active Users obtained at least a certificate during this period. Figure 7 below shows the number of certificates; total, competence, and participation, obtained by the active users of the AgMOOC platform in 9 of the phases between 2015-2020.

While on average 43% of the active users of the platform obtained a certificate, 23% obtained a competence certificate, and 18% obtained a participation certificate. Worth noting is that while the number of active users of the platform seems to increase over the years the proportion of users getting a certificate; whether competence or participation gradually decreased. In general, the number of learners who receive a certificate at the end of a MOOC has been observed in literature to be low (Kopp and Ebner, 2017). The reasons for this have earlier been reported to include professionals who are only interested in selected course content and not necessarily a certificate, and students who do not attach that much value if the MOOC does not contribute credits to their university/college study. However, for the AgMOOCs the proportion of learners receiving certificates as a percentage of total registrations during the study period was 26%, relatively higher than many other MOOCs according to literature.
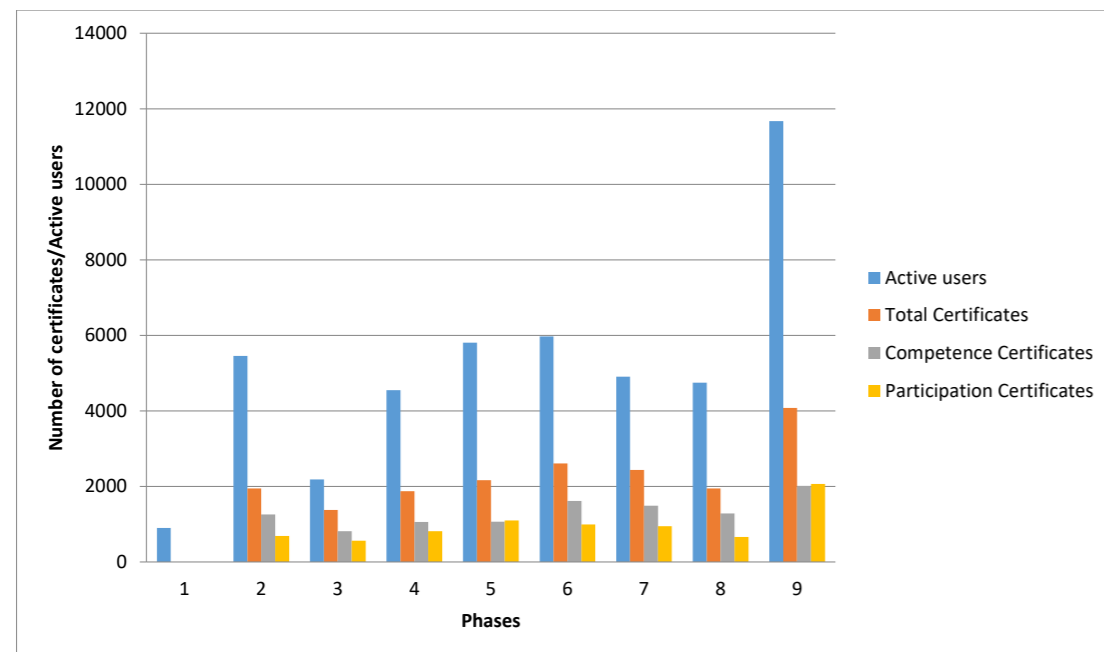
In a similar MOOC-platform (Kopp and Ebner, 2017), the percentage of participants who earned a certificate was equally 26%. The reason given for this percentage was that students, who were the majority of the participants were neither obliged to complete the course nor earn a certificate. Bingol *et al*. (2020) regard earning a certificate as one of the personal factors that had an effect on course completion, although to a less extent compared to experiencing technical challenges. Where learners experienced no technical challenges, chances of them completing a course to certification were higher (Bingol *et al*., 2020) Figure 8 below compares total registrations, active users and total certificates received during the study period.

One of the complaints from the respondents regarding the certificates was that the certificates were sent to the learners in an email through a link. However, the link would expire after a period of time. Some respondents who completed a course complained that they did not receive a certificate at all. It is possible that their link expired before they accessed them, or there was another technical issue in accessing the certificate using the link. Nonetheless, Kopp and Ebner (2014) point out that even without a certificate, learning does take place. In this study, there is good evidence to show that with or without a certificate, learning took place during the study period.

Finally the results of learning could be seen from the expressions of the learners in their responses to the open-ended questions. All the courses were highly credited by the learners. In particular, IPM courses were described by respondents as "informative, brief and to the point." The photographs, videos and PDF were especially regarded as helpful in data interpretation. They contributed to quality materials that added a memorable practical aspect to the learners. Bingol *et al*. (2020) observe that clarity of course content, a well planned course, a comprehensive course syllabus and
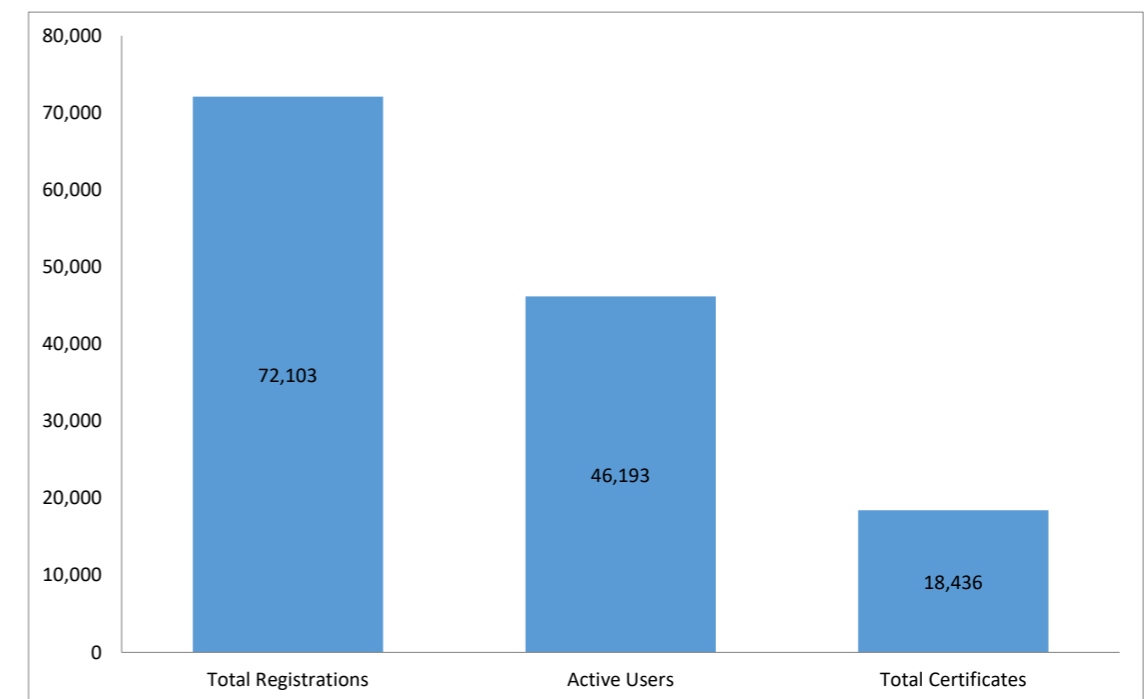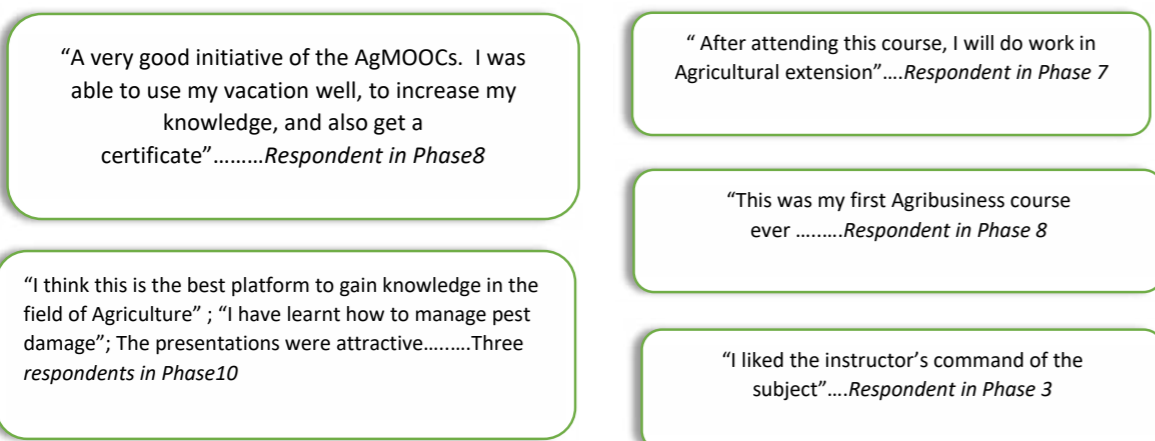
Figure 7. Number of certificates obtained by Active Users (2015-2019)

Figure 8. Total registrations, active users and total certificates

the amount of interaction with the instructor were important factors of leaners' success.

The learners appreciated pdf files because they could be downloaded and information kept for future reference. Some learners felt that there was sufficient time interval between each quiz, as well as sufficient time to complete the assignments, although some learners needed a longer course duration to be able to access and study all the interesting materials that were provided. Equally noticeable, a small percentage of about 30% of respondents preferred that the courses/course materials are translated to their local languages. It is likely that some learners had challenges with comprehending the reading materials provided in English.

Instructors answered most of learners questions during the forum discussions. This was appreciated by the learners for sharing insights on every topic with lots of examples. The forums and discussions provided a very good opportunity to clarify doubts and seek expert opinion. Bingol *et al.* (2020) confirm that participant success can be enhanced when instructors have adequate knowledge of their subject.

The following were selected responses by the learners across the phases.

> "A very good initiative of the AgMOOCs. I was able to use my vacation well, to increase my knowledge, and also get a certificate"………*Respondent in Phase8*

> " After attending this course, I will do work in Agricultural extension"….*Respondent in Phase 7*

> "This was my first Agribusiness course ever ………*Respondent in Phase 8*

> "I think this is the best platform to gain knowledge in the field of Agriculture" ; "I have learnt how to manage pest damage"; The presentations were attractive………Three *respondents in Phase10*

> "I liked the instructor's command of the subject"….*Respondent in Phase 3*

Looking at the above comments, it is clear that the expectation of the respondents to get knowledge and awareness was met, and that learning took place.

From the afore-going discussion of the responses, the following suggestions should be considered to improve course delivery:

(i) Improvement of the AgMOOC App functionality; This would be vital with the increase in the number of youth participants and their preferance to use Apps,

(ii) Enhancing interaction on the platform through improved instructor-student interaction, enabling the instructor to respond to issues in a shorter time period, and enabling student-student interaction and discussions,

(iii) Enabling the downloading of materials (video and audio), in order to reduce the cost of access to the learner,

(iv) Increase the number of videos; these support learning through their visual effects on the learner,

(v) Course translation to other languages to enable better comprehension of course content, in a

wide range of ethnic and socio-cultural backgrounds. This was a suggestion by some learners with a poor background of the English language.

Conclusion

While agriculture professionals, researchers, students among other people are continually seeking to increase their knowledge and skills, AgMOOCs offer a good opportunity to fill this gap. This study shows that the AgMOOCs offered between 2015-2020 were well appreciated by the learners who responded to the course evaluations and that the course platform was easy to access and to navigate. The learners were willing to share their knowledge with friends and colleagues, an indication of having achieved a good learning experience. The suggestions of the respondents will be useful for the improvement of the delivery of AgMOOCs. The perceptions of the learners are a good indication that the AgMOOCs should be promoted to supplement conventional teaching and learning of agriculture in HEIs, as well as in a wide range of other contexts in developing countries. The learners' perceptions also indicate that the AgMOOCs can support enhanced learning of agriculture professionals and extension service providers to address the challenges of food security and rural livelihoods in developing countries.

Acknowledgement

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