AQHED-SL

A supportive environment for strengthening evidence-based/critical thinking skills of undergraduate students

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Executive summary

AQHEd-SL aims to support stakeholder driven changes for outcome-based education to enable effective delivery of improved curricula that are aligned to job market needs to produce more employable graduates. This document focusses on the development of undergraduates' evidence-based/critical thinking skills to increase their employability and strengthen their responsibility as citizens and collects evidence how a supportive environment needs to look like.

Literature suggests that a student-centred learning approach ensures the development of critical thinking skills in higher education institutions (HEIs). This learning approach puts the students in the centre of their learning, gives them ownership over their learning and provides a variety of teaching and learning activities such as group assignments, class discussions, site visits, guest lecturers, laboratory work, internships, and project work. It can be clearly differentiated from a 'chew, pass and forget' learning approach. However, research suggests that often barriers exist when introducing the student-centred learning approach in HEIs. The barriers need to be identified and actions be planned to overcome them, while the country situation and the individual institutional context are considered. Lecturers need to be motivated through the right incentives, gain an understanding on why new teaching methods should be applied and receive training in the application of these teaching methods. The training needs to be delivered as continuous support rather than a once-off event.

Based on student-centred learning methodology, a blended learning approach consisting of a self-study component and face-to-face classroom sessions will be utilized. The online component is based on a pre-existing online course with six units that provide an introduction to critical thinking skills and which INASP developed on the Moodle learning platform. Within the AQHEd-SL project phase, a toolkit that supports the lecturers with planning classroom sessions for teaching evidence-based/critical thinking skills will be developed, and the lecturers will be given training. The toolkit will help the lecturer to relate student-centred activities to the online course units to consolidate the students' learning and let them apply their skills within their discipline. It is recommended that the blended learning approach will be embedded in the revised curricula of the four AQHEd-SL clusters.

During a workshop with lecturers from the AQHEd-SL clusters Health and STEM, the scope of the evidence-based/critical thinking skills to be strengthened was specified and environmental conditions to be considered were identified. The lecturers discussed the following main challenges when introducing a student-centred teaching and learning approach: Limited lecturer time; big class sizes and limited space; limited access to internet and devices; internet/power disruptions; skills' gap for teaching evidence-based/critical thinking skills; pre-existing students' mindset from secondary school, adverse to a student-centred teaching style. Solution ideas to overcome these barriers were collected. The following actions were recommended to support the building of an environment which is conducive to teaching and learning critical thinking skills:

- Breaking down barriers to make the learning process more effective – Change the relationship between students and lecturers, allow students to express themselves

- Identify the existing situation that lecturers and students face by taking into consideration multidimensional relations to government, institution, management, faculty, between lecturers and students; based on that develop the ideal situation

- Learn from other institutions that lecturers know/have visited; discuss openly the changes that need to happen

- Advocate a better infrastructure; look for solutions to provide students with internet access to retrieve online literature and material; use intermediate temporary solutions until the infrastructure situation has been improved

- Find incentives for lecturers and students to support teaching and learning for evidence-based/critical thinking skills

- Try to combine learning assessment for AQHEd project aims with pedagogical learning assessment

- Develop a toolkit of ideas for teaching critical thinking skills that also gives advice how to overcome barriers. The input of ideas from a number of lecturers from different clusters will help with collecting diverse ideas.

Background

AQHEd-SL aims to support stakeholder driven changes for outcome-based education to enable effective delivery of improved curricula that are aligned to job market needs to produce more employable graduates. As the AQHED-SL plan of work and budget (2018, p.7) points out, current teaching programmes in Higher Education Institutions (HEIs) in Sierra Leone (SL) are not aligned with national development and employment needs.

Research suggests that students need to develop evidence-based/critical thinking skills to increase their employability and strengthen their responsibility as citizens. Some evidence:

- In her critical thinking literature review, Lai (2011, p.4) says that "Educators have long been aware of the importance of critical thinking skills as an outcome of student learning. More recently, the Partnership for 21st Century Skills has identified critical thinking as one of several learning and innovation skills necessary to prepare students for post-secondary education and the workforce. In addition, the newly created Common Core State Standards reflect critical thinking as a cross-disciplinary skill vital for college and employment".

- In 'A connected curriculum for Higher Education', Fung (2017, p.84) points out that one dimension must be to connect students' academic learning with workplace learning. One focus is on "enabling students to engage in critical and constructive dialogue with others about the ethical application of evidence-based knowledge to society" and "this may include thinking critically about the nature and processes of work itself".

- For a study on career and life trajectories, researchers asked African alumni who had studied at international universities how they reflect on their international university experience. One finding was that critical thinking pedagogy and practical methods at university "were important for building confidence as scholars and innovators, skills that were subsequently leveraged for career advancement and effecting social change" (Marsh et al., p.8).

- The Final Report on the 2009 World Conference on Higher Education (UNESCO 2009) held under the overarching theme of The New Dynamics of Higher Education and Research for Societal Change and Development (UNESCO, Paris, 5-8 July) mentions related to social responsibility of higher education: "Higher education institutions, through their core functions (research, teaching and service to the community) carried out in the context of institutional autonomy and academic freedom, should increase their interdisciplinary focus and promote critical thinking and active citizenship. This would contribute to sustainable development, peace, wellbeing and the realization of human rights, including gender equity." And further: "Discussion during parallel sessions, involving a variety of higher education's key actors, tended toward the conclusion that higher education institutions must provide students with the kinds of skills that will last a lifetime. These might include the academic capacity to solve problems and think critically, the flexibility to re-learn and un-learn skills, an understanding of society and the world as well as ICT and entrepreneurial skills".

The following text will discuss how an environment that supports undergraduate students with strengthening their evidence-based (critical) thinking skills needs to look like. We present information that is based on

- Literature research

- Information about the country context as found in the AQHEd-SL plan of work and budget – the information will be complemented with SL partners' expertise later

- Learning from a test run of INASP's online course on critical thinking skills with students from Mzumbe University in Tanzania. AQHEd-SL plans to use a blended learning approach, consisting of this pilot online course and face-to-face classroom sessions, to strengthen evidence-based/critical thinking skills of undergraduate students

- Learning from other online and blended learning approaches INASP developed previously

Literature research

Student-centred approach

The above mentioned final report on the 2009 World Conference on Higher Education (UNESCO 2009) comes to the conclusion on 'The learning experience and critical thinking: "A student-centred approach across the board ensures critical thinking and active participation in the improvement of the quality of higher education. This can only be successful if higher education institutions rethink the way teaching is performed and courses constructed, so that the students are in the centre of the institutions' strategies." The report differentiates such student-centred pedagogy from an approach where students are encouraged to "'chew, pass and forget' their curriculum and exams rather than to engage critically with their course content and teachers". Furthermore, the report encourages universities to "develop the concept of learning by doing as much as possible to support and recognize informal learning within student organizations so as to encourage entrepreneurial and value-based mindsets".

Schendel (2016) mentions the following activities as examples for elements of student-centred pedagogy that have a positive impact on critical thinking skills: Group assignments and class discussions, site visits, guest lecturers, laboratory work, internships, and project work. Examinations can encourage critical thinking when they include open-ended, application-based questions in which students synthesize their learning by proposing a solution to a complex problem.

However, Schendel found that such activities were often not applied in an effective way for all students. For example, only some students contributed to group work and others just contributed money for photocopying fees but added their names to the group assignment. Group discussions were limited to students asking questions or a lecturer selecting the right definition of a concept in discussion rather than being a forum for exploring new ideas and discussing diverse perspectives. In a laboratory environment, students were discouraged from conducting own experiments due to limited resources; instead they could only observe experiments conducted by lab technicians. Open-ended questions in exams were quite limited so that students could avoid them and still pass.

Schendel also mentions a lack of support when students learn through project work. This prevents that students are able to learn from the experience in an effective way. Often students even choose to plagiarise work from other students or sources when doing project work.

This leads to the assumption that faculties need to develop capacity in applying student-centred teaching approaches in order to support students and make effective changes in students' learning.

Faculty development

Schendel's study of student learning at three of Rwanda's most prestigious public universities suggested that Rwandan students are not improving in their critical thinking ability during their time at university (Schendel 2016). Schendel's article reports on a series of faculty-level case studies, which were conducted at two of the participating institutions in order to investigate some of the reasons behind these results. It points out that "although educational practices likely to foster critical thinking skills are required elements of the undergraduate curriculum at both institutions, the case study analysis suggests that these practices are being fundamentally altered during implementation, because of a limited understanding of the rationale for pedagogical change and low levels of faculty motivation to implement more labour-intensive teaching methods". Schendel therefore concludes that "teaching and learning policies are only likely to be effective if accompanied by pedagogical training and support for ongoing faculty development".

Schendel's research shows there is the risk that new teaching/learning techniques are changed by lecturers in a way that "suit their pre-existing teaching practices" but aren't so effective for strengthening critical thinking skills. Schendel points out two primary reasons for this adaptation process: "Limited understanding of the proposed pedagogical changes and limited motivation to implement labour-intensive teaching methods".

Schendel identified the following barriers for adopting new effective teaching methods:

- Lecturers 'grew up' with traditional teaching methods that are seen as "synonymous with the concept of education"

- Training in new teaching methods are delivered as stand-alone events; no continuous support has been given

- Lack of understanding why innovative teaching methods should be applied, how they support students' learning

- Students can show feelings of disorientation or even annoyance when first confronted with new learning methods what can lecturers put off

- More time and effort are required for preparing such new teaching lessons

- Lack of incentives to put more effort into teaching - low salaries and consequently low faculty morale lead to low motivation

- Increasing student numbers lead to decreasing lecturer time per student

- Challenging infrastructural constraints such as lack of chairs

- Lecturers feel pressurized by many changes in the HE policies in a relatively short period of time

One can conclude that, considering the HE context in the country, barriers of teaching innovation need to be identified and diminished in order to create a supportive environment for strengthening students' critical thinking skills. When identifying the barriers and planning actions to overcome them, the country and individual institutional context needs to be considered. Lecturers need to be motivated through the right incentives, gain an understanding on why new teaching methods should be applied and receive training in the application of these teaching methods. The training need to be delivered as continuous support rather than a once-off event.

Utilization of teaching techniques and technologies
Dockter (2012) discusses teaching methods in accounting. He states that student-centred teaching techniques such as 'problem-based learning' should be combined with technologies such as learning management systems (LMS) and software packages to support a friendly and interactive learning environment.

Hansen (2006) defines problem-based learning (PBL) as a **teaching technique** that "uses complex, real-world problems to motivate students to identify and research the concepts and principles they need to know to solve these problems. Students work in teams to acquire, communicate, and integrate information. The goals of PBL are to help students (a) think critically, analyze, and solve complex real-world problems; (b) find, evaluate, and use learning resources; (c) work cooperatively in teams; (d) demonstrate effective communication skills; and (e) use content knowledge and intellectual skills to become continual learners." Dockter (2012) argues that such teaching techniques can "build a better learning environment by elevating the student from a passive to active learning role" what supports the development of higher cognitive skills. As effective learning techniques in accounting, he mentions for example case studies, simulations, role-play, and activity-based projects to involve the student in the learning process and to increase knowledge retention and application as well as motivational outcomes.

The use of **software packages** can help students apply their learning in a very practical way and encourage them to learn critical analytical skills. An example is Ringelstein's study (2009) about a costing assessment task where students had to use an Excel spreadsheet. The task was designed to improve students' analytical, computing and written communication skills while letting them apply their accounting knowledge. Ringelstein concludes that the use of Excel spreadsheets was a "valuable learning experience for students regardless of the level of prior experience that they may have with Excel". Teaching challenges due to differences in the students' experience with Excel were overcome by using students with more experience as mentors for other students.

Learning management systems (LMS) can help with offering learning material and tools as well as with monitoring and evaluating students' engagement what could help lecturers to support their students better. An example is Mo's study (2011) on the effect that the use of online learning tools had on students' engagement. The course was delivered face-to-face with voluntary online learning elements, using tools such as online self-assessment quizzes. An LMS was used to provide students

with learning material, send group emails to summarize course contents and remind students on deadlines, and to give access to online learning tools. Mo was able to measure students' engagement and motivation by using the student activities recorded by the LMS Blackboard Vista as a proxy. Further analysis showed that the students engagement with the learning tools was positively associated with their performance in the course overall.

Cultural aspects

Serpell (2007) points out that HE should not only meet "the expectations of an international community of scholarship and science" but even more importantly its curricula and certificates need to be "legitimate in the eyes of the national government, business and industry". Serpell argues further that "African universities have inherited from the west a number of institutionalized arrangements for learning that are imperfectly designed for promoting genuine appropriation by students of the literacy, science and technology that will empower them to transform the world and pioneer social progress".

Serpell shares some of his observations:
"In Zambia, many university students originate from families in which literacy is relatively restricted, and that rely on one or more of the indigenous languages of Zambia for expressing and sharing their practical understanding of the world. Given this background of primary socialization, I surmise that these students arrive at the University of Zambia with only a partial sense of ownership of the literate culture in which they have excelled at secondary school in the medium of instruction, which is English. Their mastery of that culture is perhaps grounded less in the intrinsic motivation that arises from membership/ownership of the community of literate practices, than in a disciplined application of explicit study skills and attitudes. That explicitly studious perspective, while evidently effective for the immediate mastery they have achieved of the high school curriculum, may tend to encourage compartmentalization of the knowledge and understanding that students acquire at school, and thus insulate it from their more intuitive understanding of the world grounded in indigenous languages and beliefs."
One can therefore conclude that the effectiveness of learning approaches needs to be assessed in the context of the learners' culture before adopting them.

Serpell gives one example of a learning approach that was tested with students of the University of Zambia who were enrolled in a counselling or child development course. The undergraduates were given project assignments where they engaged in various ways with enhancing the welfare of young children in nearby, poverty-stricken neighbourhoods.

Serpell suggests that in such project assignments in which the students' background is acknowledged can serve as a way of ensuring that the endogenous African experiences and knowledge that students can bring to the academy are utilized. Serpell draws attention to "their potential for

- bridging between the canons of the discipline and students' culture of origin

- promotion of metacognitive awareness

- building relevance into the preparation of students for the demands of the economy in which they aspire to work after graduation"

Serpell's study shows that the overall evaluation of the experience was very positive. However, the study revealed that such project assignments need to give the students clear goals, the projects need to be well selected to give the students the opportunity to apply what they learned in university, and be well supervised by HE staff.

Schendel & Tolmie (2016) point out that "there is substantial evidence to suggest that assessment in a foreign language underestimates the critical thinking ability of respondents, because respondents using a foreign language are required to devote a substantial proportion of their working memory to the comprehension of assessment questions".

Schendel & Tolmie (2016) acknowledge that cultural bias in assessment exists and can best be overcome by explicitly developing tests for use in specific contexts. However, they point out that "resource constraints often prevent this possibility. An alternative strategy is to adapt an existing instrument for use in a particular context". They give an example of how an existing test for critical thinking skills, a performance task, was adapted for use in a Rwandan context. The adaptation of the existing test required some resources, but the authors strongly recommend the use of a cultural

adaptation method when seeking to assess critical thinking in a new cultural context. "If the original version of the CLA [Collegiate Learning Assessment, a test for critical thinking skills] had been used in the Rwanda study, it is clear the validity of the study results would have suffered substantially".

This suggests that HEIs in Sierra Leone need to think through how they can assess students' learning in terms of critical evidence-based thinking thoroughly.

Country context analysis by AQHEd-SL partners

Motivation and assumptions based on the AQHEd-SL Plan of Work and Budget

The Higher Education (HE) sector in SL faces some challenges when supporting the students with their learning as outlined in the AQHEd plan of work and budget (2018):

- Poor financing

- Limited staff training opportunities

- Poor teaching and research infrastructure

- Absence of effective learning services

- Gaps in the pedagogical skills of faculty

- Lack of an effective quality management system & no functional internal quality assurance (IQA) systems in the HE institutions

- Reliance on teacher-centred approach

These limitations will need to be considered when developing a learning approach that will strengthen students' evidence-based thinking skills and consequently their employability. However, on a higher level the limitations are also linked to some chances that can support the building of a supportive environment. As the AQHEd-SL plan (p.7-9) points out, there is

- A sense of urgency to strengthen the state of education and public ownership and to incorporate stakeholder contributions across the country

- A certain level of awareness of challenges within the HE institutions

- The Universities Act of 2005 that applies to all 7 HEIs and provides an opportunity for collective action

- The Consortium of HEIs (CHEI) that was established for the AQHEd bid writing and can help to distribute the understanding what a supportive environment means

- A commitment to equal partnership among the AQHEd partners which will support the definition and implementation of a generally accepted supportive environment in all HEIs and give the opportunity of building synergies when partnering

Another important factor for the successful implementation of a supportive environment in HEIs is effective communication. The AQHEd-SL plan stresses the importance of communication

- To share learning and tools across the work packages and HEIs

- To foster national support – Communication needs to happen across HEIs by utilizing the established CHEI and the Committee of vice chancellors and principals (CVCP). Communication channels with the government and a broad range of stakeholders will be established and public engagement supported

- To report to SPHEIR and share learning with other SPHEIR projects

The HE Learning Management System (LMS) which is in development by the SL NREN (WACREN), funded through the World Bank will support teaching and learning approaches by providing learning resources.

The mentioned limitations and chances lead to the following assumptions about aspects of a supportive learning environment for students:

- HE management and faculties see the urgency to strengthen evidence-based thinking skills to improve students' employability and responsibility as citizens

- HE management and faculties are aware of the limiting challenges within the HE institutions and work together on finding solutions, within and across the HEIs

- Effective communication to share learning and tools within and across the HEIs has been established

- The LMS can be accessed in all HEIs and will be used by faculty to provide teaching and learning resources

- Learning from other SPHEIR projects will be shared with the SL partners

- The AQHEd initiative is supported by national stakeholders such as the government, employers and the public opinion

Scope of skills to be strengthened

During a focus group meeting (September 2018) with lecturers from the STEM and Health clusters and the working group 3 lead, the scope of a teaching and learning approach for strengthening evidence-based/critical thinking skills of undergraduate students was identified.

There is a range of skills that lecturers want students to learn to strengthen their evidence-based/critical thinking skills:

- Objective thinking

- Focussing on evaluating information; distinct from 'creative' thinking

- Practicing reading skills

- Utilizing tools for critiquing articles, work, methodology

- Investigative learning

- Asking advanced questions, e.g. 'why'-questions

- Questioning mindset; not just accepting what others (e.g. lecturers) say; also reflecting on own mindset

- Looking critically at concepts, based on evidence

- Gathering and interpreting evidence

- 'Real world' application - from theory to practice; looking beyond theories by considering practical implications

- Making decisions based on evidence

- Synthesis – asking questions that help to use information/evidence to learn something new

- Communication skills – practicing discussions/conversations

The understanding of the terms **'critical thinking'** and **'evidence-based thinking'** and which skills' are prioritized differ among the disciplines and target beneficiaries. Therefore, lecturers are encouraged to select and use the appropriate term and tailor the skills that they will teach to their course. For example, a lecturer will need to address different skills when teaching pharmacy for technicians compared to other degree levels with full research projects.

AQHEd intends to use a blended learning approach, consisting of INASP's pilot online course 'Questioning as we learn – An introduction to critical thinking skills' and face-to-face classroom session. The online course exists in a pilot version on the Moodle learning platform. During the project phase, a toolkit for lecturers will be developed that helps them with planning their lessons. This toolkit needs to support the selection of activities that strengthen specific skills.

Environmental conditions and challenges

The focus group discussion revealed some relevant conditions that the lecturers and students face and provided some ideas on how to overcome challenges:

- Limited lecturer time
  Solution ideas: A blended learning approach with a self-study (online) component can help the lecturers dealing with bigger class sizes. A discussion forum can be incorporated in the online component and support peer learning. The discussion forum can be set up with specific questions by the lecturers to guide discussion from the beginning instead of monitoring/moderating the discussion continuously

- Big class sizes
  Solution ideas: If the lecturer has a big class size (e.g. 200 students), learning assessment could be based on multiple choice or short answer questions to make marking easier. However, it will be a challenge to support and assess the skills development which has been described above nevertheless; one idea could be that students will be split in smaller groups to work on mini projects

- Students' often have very limited internet access
  Solution ideas: Students could go through the online component in a classroom setting; e.g. providing them with laptops and ensuring an offline version of the course. Technical solutions like the Moodle box (a small internet independent device that provides wifi connection for the learning platform Moodle) and/or Moodle app with (limited) offline functionality will need to be further explored. The use of smart phones could be another alternative.

- Internet/power disruptions
  Solution ideas: Besides the above mentioned technical solutions, flexible time periods when students can work on the online course could counteract disruptions.

- Not all lecturers have sufficient skills for teaching critical thinking skills
  Solution ideas: Training during AQHEd-SL will be provided to build a foundation of skills.

- Students come with a certain mindset from secondary school: The teacher is supreme; students rely on material provided by teachers rather than using primary evidence/information; students are not willing/able to make their own inputs
  Solution idea: The lecturer gives students time to adapt to the new university environment and supports them in the transition period; the lecturer encourages research, speaking out, and independent thinking in the first year to set the standard of learning.

- Lecturers face diverse conditions and challenges in terms of pre-existing students' skills, infrastructure, class size
  Solution idea: A toolkit with different options will be provided so that lecturers can select and adjust the most appropriate option for their specific situation; the input of ideas from a number of lecturers from different clusters will help with collecting diverse ideas.

Actions to build a supportive learning and teaching environment

During the focus group discussion, the lecturers identified actions that will support the building of a supportive learning and teaching environment for evidence-based/critical thinking skills:

- Breaking down barriers to make the learning process more effective – Change the relationship between students and lecturers, allow students to express themselves

- Identify the existing situation that lecturers and students face by taking into consideration multidimensional relations to government, institution, management, faculty, between lecturers and students; based on that develop ideal situation

- Learn from other institutions that lecturers know/have visited; discuss openly changes that need to happen

- Advocate a better infrastructure; look for solutions to provide students with internet access to retrieve online literature and material; use intermediate temporary solutions until the infrastructure situation has been improved

- Find incentives for lecturers and students to support teaching and learning for evidence-based/critical thinking skills

- Try to combine learning assessment for AQHEd project aims with pedagogical learning assessment

- Develop a toolkit of ideas for teaching critical thinking skills – e.g. including mini projects such as designing electricity provision for a village

Suitability of a blended learning approach and necessary adjustments

INASP has been developing a blended learning approach consisting of a self-study online course and related classroom sessions that will be facilitated by the lecturer. Within the focus group discussion, the following opportunities that a blended learning approach provides where identified:

- Flexibility of learning

- Interesting and effective way of learning

- Self-study component helps faculty when facing limited time

- Soft skills development that are asked for by employers

- Supports students' marketing and employability

- Chance of providing a supportive environment for women – the online course can address relevant subjects and allows learners to express themselves in a safe environment

Based on the context analysis, the following adjustments to the context in Sierra Leone were suggested:

- Consider the curriculum desired by employers when planning classroom sessions and developing the toolkit

- Embed the blended learning approach in the revised curricula of the AQHEd-SL clusters

- Try to combine the learning assessment for project needs with the pedagogical learning assessment and give incentives

- Use any Moodle features for the learning assessment while still offering a safe learning environment to students; find a balance between monitoring the students' learning and allowing them to make mistakes and enjoy learning without the feeling of being observed; offer a shared and a private space

- Identify the gender-specific needs of women and men that should be supported

- Find a balance between specialised subject knowledge & skills and broad soft skills to support students' employability

- Support the lecturers with a 'baseline analysis' at the beginning of the course and each lesson – What should the students know? What do they know? One could start with a Q&A review of previous learning, allowing students and lecturers to ask questions

- Offer support for dealing with challenges and disruptions (e.g. lack of equipment, classroom space, power, internet)

- Consider that lecturers need training in lesson planning methods, teaching skills and learning assessment skills for teaching critical thinking skills

The self-study component of the blended learning approach - Learning from a test with students

Some students from Mzumbe University in Tanzania tested INASP's pilot version of the online course 'Questioning as we learn – an introduction to critical thinking' between February and June 2018. Three of them gave some useful feedback that the following findings are based on.

Support

Students ask for a good support network to solve technical issues that can come up when using the online course.

A student's feedback suggests that some students appreciate support in terms of feedback on their learning progress: "From my question point of view I […] prefer my lecturer to see my activities, That can be one way of help my lecturer to know my progress throughout the course in order to find a way he/she can help me to improve my study, also this can motivate a student to study as when there is frequently comment on student's answer from his/her lecturer. [For] a student him/herself it can be hard to evaluate his/her learning progress although there will be discussion. It is not [a] must for a lecturer to view all the activities of his/her students, but in order to evaluate his/her class progress [he/she] should see even some of activity or assessment."

We should consider that students or group of students may need different support. E.g. we don't know the reasons why only male students participated in the course test; more research is necessary whether female students may need other support than male students.

We found some evidence that students started immediately to apply their learning on critical thinking. One example suggested that this could lead to challenging behaviour to teaching staff that lecturers may not be used to. We need to discuss how we can prepare teaching staff to expect students may apply critical thinking skills when interacting with teaching staff and how staff should respond to that in order to encourage the application of learning.

Variety of learning activities

The students appreciated the variety of learning activities and support strategies. The following items were mentioned as useful and/or motivating: Examples; pictures, diagrams videos & animations; quiz; 'card game' to test logical thinking skills; communication tool (discussion forum); text that can be easily understood.

The students also mentioned that they enjoyed learning "new things" and being able to apply their learning in academic and non-academic life.

Ownership

It seems to be important to encourage students to take over ownership of their own learning. In the test course, we asked the students to accept a learning agreement. One student rightly pointed out that we only offered the option to accept the agreement if the student wants to start the course. The student felt students should also get the possibility to disagree with the agreement and explain their reasons.

Right timing

One student found the critical thinking course in particular useful, since he had some research work upcoming. His feedback suggests that the right timing of offering the course can be a motivating factor: "Currently I am a second year student and I am attending Bachelor of Science in Mathematics and ICT with education. (BSc (M-ICT) Edu). Here at our university, students from different courses (apart from educational courses) are required to conduct their research during the first semester while they are in third year. On our side (educational students), we are required to conduct a simple research while we are in second year, which at the end we are required to present it as a field report. It is not a detailed research indeed, but somehow it requires a simple study between variables for example 'The effect of reinforcements on students' performance in Mathematics subject.' Then by that

way we finally present our final report though they involve simple techniques as conducting a research. I am in love with researching ..."

Peer learning

Students are aware of the value of peer learning but also feel the interaction between students needs to be encouraged. One student said: "[…], sometimes students may decide to share with others as they are aware they'll be rewarded a little bit. (Though that's not good, but at least it can motivate students to share with others and learn from others as well). I see it from our school where students are reluctant to share with others unless some external efforts (where by teachers decide to reward those who will be participating)."

The course design should make the communication between students easy. Students asked for notifications when new posts of other students have been added.

Students appreciated the Moodle forum tool for peer-to-peer communication. Since such forum discussion need at least basic moderation, AQHEd needs to find a good solution who could take over the moderation – lecturers, tutors, student ambassadors?

Students may also want to connect on a one-to-one basis. One student suggested that we set up the Moodle message tool or make it clearer that they can get in touch with each other by email. The student came from his own experience when he wanted to ask other students something: "Just to let you know, this question arose as I decided to try sending some messages to some participants who have been enrolled in the system (sometimes back). So I though they have benefited much from the course and I wanted to communicate with them concerning the experience they've been through and how much helpful was the course as well as how they've been applying the skills in day to day decisions."

Learning from other INASP online courses

Evaluation findings from previous online courses and blended learning approaches suggest some influencing factors when it comes to participating in the learning approach, completing courses successfully and applying learning.

We found that the following factors may influence the participation and the learning success when participating in online or blended learning approaches:

- IT literacy/computer skills
- Support provided to the participants during an online course
- Quality of the technical infrastructure such as internet connectivity (bandwidth; connectivity disruptions); power supply
- Access to internet and equipment (e.g. computers)
- Time availability and management; e.g. other work and private commitments
- Access to funds (e.g. for buying internet access)
- (English) language skills
- Participation in discussion forums (that was associated with course completion in INASP MOOCs)
- Gender (only found in some countries)

The following factors can influence how participants apply their learning:

- Gender
- Mode of delivery (online; face to face; blended)

Participants in previous INASP MOOCs also expressed the following learning preferences and expectations:

- Mobile phone usage for accessing the online course. The country context seemed to influence that. Women were more likely to prefer (and actually to use) mobile devices in INASP MOOCs.

- Very positive feedback about the support through facilitators, and also peer support in forums

- Hard deadlines are a particular challenge – many participants need flexibility

- Lot of positive feedback about videos (both professionally created and in-course discussion videos), and requests for more. But about 10% of respondents say they were unable to watch due to technical difficulties

It should be noted that these online courses targeted (mainly early career) researchers and librarians and the transfer of findings to undergraduate students may be limited. However, we think the previous courses can still give an indication what criteria should be taken into account when defining a supportive learning environment for students.

Summary of areas and aspects of a supportive environment

AQHEd-SL needs to address opportunities and challenges for establishing a supportive environment for students in higher education to strengthen their evidence-based/critical thinking skills. The following areas and aspects were identified:

Student-centred learning approach
A student-centred learning approach allows students to engage critically with their course content and in discussions.

The learning approach offers a variety of learning activities and media, encourages students' ownership over their learning and utilizes peer learning by offering adequate communication channels.

Lecturers need to offer the learning lessons at the right time so that students can apply their learning effectively in assignments or real-life scenarios.

Student-centred teaching techniques can be combined with supportive technologies such as learning management systems (LMS) and software packages to offer a user-friendly and interactive learning environment.

The students' cultural background needs to be acknowledged and the learning approaches be assessed as appropriate and effective.

The needs of diverse student groups, considering aspects as gender, ethnicity, disability and others need to be identified and the students must receive sufficient support, in relation to technical issues and pedagogical needs

Learning approaches need to be adjusted to the students' abilities and existing skills such as information and computer literacy and language skills

Lecturers and students need to be given sufficient time to engage with the teaching/learning approaches

Capacity development in HEIs
Higher education management and faculties see the urgency to strengthen evidence-based/critical thinking skills to improve students' employability and responsibility as citizens, are aware of the limiting challenges within the HE institutions and work together on finding solutions, within and across the HEIs.

Barriers of innovative teaching approaches need to be identified and effective measures to overcome them implemented.

Lecturers/tutors must receive training in new teaching methods and continuous support when applying them.

Learning approaches, material and tools will be shared among the HEIs.

National support needs to be created through a communication plan.

Quality of infrastructure

Lecturers and students need to be provided with access to the required learning tools, for example through a LMS.

The quality of the infrastructure (e.g. internet bandwidth, power supply, availability of equipment such as computers) must allow sufficient access to the learning tools. While a sufficient infrastructure being in development, lecturers and students need to be supported with interim solutions.

Monitoring, evaluation and learning (MEL)

The learning approaches and the students' performance are monitored and evaluated on a regularly basis, including the feedback of all stakeholders. The learning assessment should combine project as well as pedagogical needs as far as possible.

HEIs need to act on any learning from findings.

Learning about the approaches, techniques and tools will be shared across the HEIs.

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