

PHI: BAGUIO CITY SMART FLOOD WARNING, INFORMATION AND MITIGATION SYSTEM

MODULE 3 EVALUATION REPORT
TARGETED CAPACITY BUILDING PROGRAM TO ENHANCE
DELIVERY OF A SUSTAINABLE FEWS

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1 BACKGROUND AND OBJECTIVE



1.1 BACKGROUND

The ASEAN Australia Smart Cities Trust Fund (AASCTF) was established in April 2019 as a single-donor trust fund financed by the Government of Australia, through its Department of Foreign Affairs and Trade (DFAT) and managed by the Asian Development Bank (ADB). The AASCTF aims to facilitate participating cities' transformation to becoming more livable, resilient, and inclusive, while in the process identifying scalable best and next practices to be replicated across cities in Asia and the Pacific.

In August 2020, the AASCTF Task Team (led by Ramboll) commenced work on the implementation of the "Baguio City Smart Flood Warning, Information and Mitigation System" pilot project. The development of the Flood Early Warning System (FEWS) under the pilot project is taking place in collaboration with Baguio Local Government Unit (LGU) and other key stakeholders to improve community disaster preparedness, raise awareness, and ensure local ownership. The FEWS is furthermore set to become an integral element within the overall vision of Baguio City to become a truly resilient, dynamic, and smart city.

In an effort to further solidify and enhance program effectiveness and sustainability (beyond the completion of the pilot project in December 2022), an additional component, comprising a year-long "Targeted Capacity Building Program to Enhance Delivery of a Sustainable FEWS" was added to the Baguio pilot project, effective from end-December 2021.

The main objective of the targeted capacity building program from outset has been to garner increased confidence in the ability of the project intervention to foster long-term sustainability of the established FEWS by securing the required local capacity for operating and utilising the FEWS as an active risk mitigation instrument beyond the timeframe of the pilot project.

This report constitutes final deliverable of the "Targeted Capacity Building Program to Enhance Delivery of a Sustainable FEWS".

1.2 TARGETED CAPACITY BUILDING PROGRAM

When the Baguio pilot project commenced in August 2020, the original scope included a track for On-the-Job (OTJ) training to be provided to those few staff members of the LGU who would be responsible for the long-term sustainability (i.e., operation and maintenance) of the FEWS. At the time of actually scoping the OTJ training efforts the responsible LGU staff had yet to be identified. Ramboll made an effort during project start-up to communicate clearly to the LGU regarding the ideal and appropriate qualifications and experience levels of preferred candidates for the OTJ training (and hence long-term operation and maintenance). Nominations from the LGU were officially received in the latter half of 2020. None of nominated candidates in fact satisfied the requested preferred qualifications/experience; all otherwise being somewhat rather tangentially involved in an area of disaster risk management, drainage infrastructure management or IT infrastructure management. Furthermore, as confirmed by the LGU, more aptly suitable candidates (i.e., an educational background in hydrology, hydraulics/hydrodynamic modelling, FEWS, programming or similar) from among the existing staff pool did not exist. Despite lackings in qualifications, all nominated LGU candidates possessed a high level of interest and motivation both in terms of being upskilled in their FEWS knowledge and capabilities, as well as in being involved in the long-term operation and maintenance of the system.

Accordingly, discussions between Ramboll and ADB commenced already in the first half of 2021 regarding the inability for the Task Team to, without significant additional effort and targeted capacity building, ensure an effective OTJ training and knowledge transfer under the originally scoped pilot intervention. Thus, in the second half of 2021 this additional Targeted Capacity Building Program was greenlighted by ADB, and a joint collaboration between Ramboll and DHI (the developer of the MIKE suite software) ensued. Maximizing the collaboration potential, Ramboll continued to lead the OTJ training component (with the first on-site OTJ training occurring in June 2022), while DHI took lead in execution of the 3-module targeted training program commencing in early 2022 (the timing of which enabled a foundational/introductory understanding of FEWS to be garnered by the participants ahead of the June 2022 on-site OTJ training).

At every turn of the scoping and execution of the Targeted Capacity Building Program the focus from Ramboll/DHI side has been on increasing FEWS knowledge institutionalisation and resilience within Baguio. In an effort to increase inter-institutional collaboration while also building lasting partnerships and maximizing Value for Money (VfM) at the outset, Ramboll/DHI together with ADB agreed to expand the participant group for the targeted training from the original five (5) "core group" LGU members to include an additional six (6) "peer group" non-LGU members. The nominated members of the peer group were identified in January 2022 with the assistance of the LGU. The peer group participants were selected on the basis of (i) having relevant educational background and experience, and (ii) motivation/commitment to support in the long-term sustainability of the FEWS. The peer group participants were nominated from- and represented different local public institutions including: 3 participants from 2 universities, 1 from PAGASA, 1 from DOST-CAR, 1 from the District Engineering Office (BCDEO).

As of February 2022, a total of eleven (11) professionals were selected/confirmed to participate in the Targeted Capacity Building Program. After the completion of Module 1, one (1) participant from the peer group (from University of the Cordilleras) had to leave the program due to added responsibilities and changed schedules and requirements in their current projects. After the completion of Module 2, one (1) IT participant from the core group (LGU) had to leave the program to go for further studies. On the other hand, two (2) additional IT staff from the LGU's Management Information & Technical Division (MITD) have joined the team. Hence, eleven (11) trainees have actively been participating in Module 3 of the program.

1.3 THE 3-MODULE TRAINING PROGRAM

The structure and content of the 3-module training program is described in detail in the “Scoping and Training Course Design Report”. The program consists of three modules, which are sub-divided into a total number of 10 sub-modules (cf. Figure 1.1). **Module 1** (FEWS introduction and basic training), which was facilitated between 22 March and 29 April 2022, consisted of two instructor-led sub-modules (1a & 1b) and one self-paced sub-module (1c). The evaluation of Module 1 is described in the “Module 1 Evaluation Report”. **Module 2** (Hydrological and hydraulic modelling), which was facilitated between 03 May and 14 June 2022, consisted of two instructor-led sub-modules (2a & 2d) and two self-paced sub-modules (2b & 2c). The evaluation of Module 2 is described in the “Module 2 Evaluation Report”. **This evaluation report covers the three sub-modules in Module 3 (FEWS and flood risk dissemination), which were facilitated between 14 September and 27 October 2022.** Furthermore, this report also contains an overall evaluation of the 3-module training program.

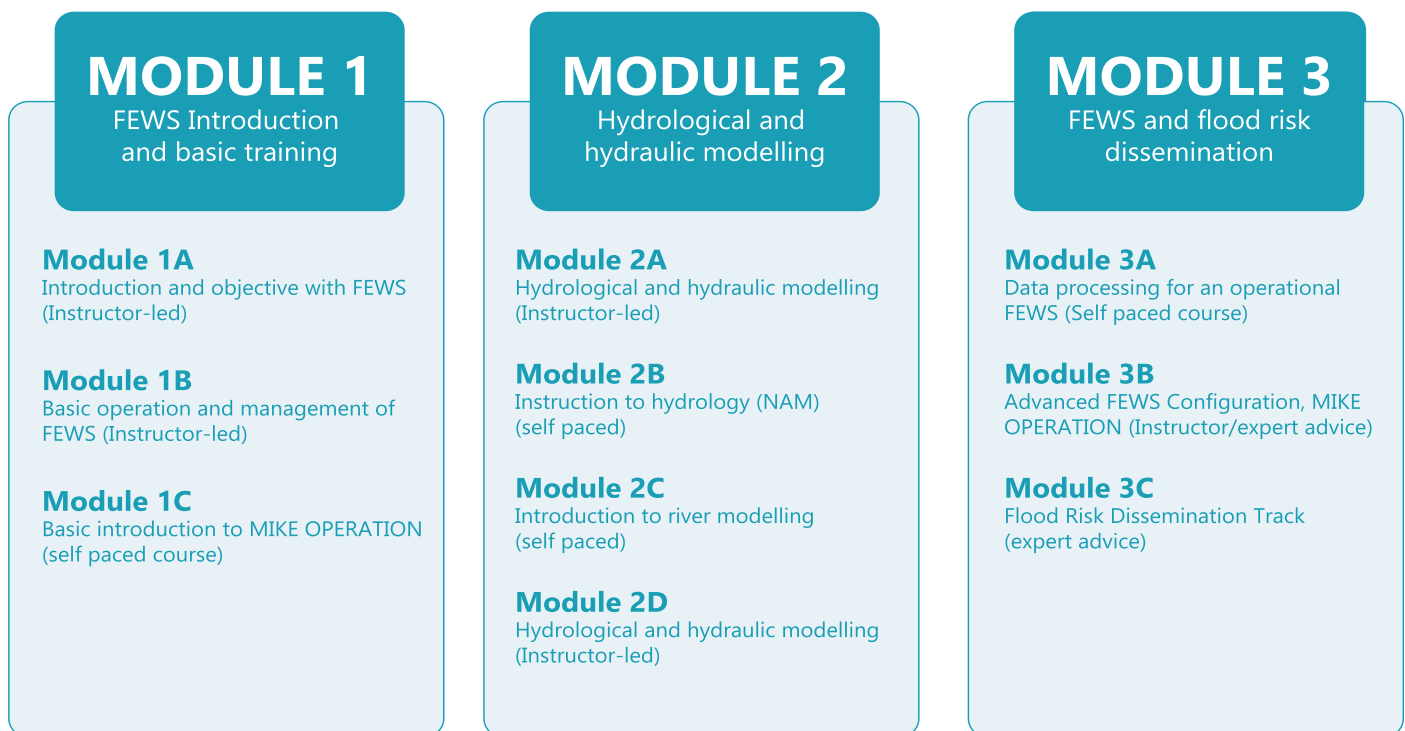


Figure 1.1 Illustration of the structure of the training program with three training modules and the underlying 10 sub-modules. Four of the sub-modules were self-paced, while the remaining sub-modules were instructor-led or based on expert advice.

Source: Ramboll

All the training materials have been made available through the ACADEMY by DHI eLearning Platform, which was described in the previous evaluation reports.

1.4 ASSESSMENT OF THE CAPACITY OF PARTICIPANTS PRIOR TO THE START OF THE TRAINING

Prior to the commencement of the training program, all eleven (11) original participants were interviewed to garner a proper understanding of their educational and professional backgrounds, as well as existing skills and experience related to the training modules in order to tailor and adapt the program to the trainees' capacity.

The baseline assessment of selected participants' capacity is presented in the "Scoping and Training Course Design Report". The main conclusions from this report were listed in the previous evaluation report. When evaluating the performance of the participants it is very important to keep in mind that **none of the LGU core group members have an educational background in hydrology, hydraulics and modelling**, and their knowledge in these areas was found to be none-existent or very limited prior to the start of the training program. They all have a BSc, but none of them with an educational background in water resources. Instead, two have a BSc in Nursing, two have a BSc in IT/Computer Science and one has a BSc in Civil Engineering.

1.5 COURSE MONITORING AND EVALUATION

To ensure that the content, the technical level, and the format of the training are suitable for the participants, the lead trainers of DHI and Ramboll have been engaged in continuous dialogue with the participants to ensure that the training program meets expectations and is adapted to the wishes and suggestions from the participants. Accordingly, participant feedback has been actively encouraged and addressed constructively in all training and knowledge exchange sessions through open dialogue and discussion.

For Module 1 evaluation surveys and quizzes were also included in each sub-modules and was available to the participants through the eLearning Platform. Through continuous feedback dialogue with participants, it was observed that the number of evaluation surveys and quizzes were overwhelming for participants. Thus, for Module 2 it was decided to adapt the sub-module evaluation to dialogue-based feedback, having a quiz for each of the self-paced courses and then an evaluation survey covering the whole of Module 2.

Furthermore, a Workshop (W3) was facilitated following Module 2 as part of the Midway Program Effectiveness Assessment. Prior to the workshop, the participants completed a Midway Program Evaluation Survey, which included questions asked in the Knowledge Assessment Survey carried out prior to the program kick-off, to assess the effectiveness of the program.

After the completion of Module 3, the participants were asked to complete a quiz and an evaluation survey covering Module 3. Furthermore, a Workshop (W4) was facilitated following Module 3 as part of the Final Program Effectiveness Assessment. Prior to the workshop, the participants completed a Final Program Evaluation Survey, including questions asked in the Midway Program Evaluation Survey after Module 2 and the Knowledge Assessment Survey carried out prior to the program kick-off, to assess the effectiveness of the program.

1.6 DECISION GATES

The training program had two (2) **Decision Gates (DGs)**. A decision gate is a point in the process, where the criteria related to the specific decision gate need to be met in order to continue with and/or modify the remaining portion of the training program. The first decision gate (DG1) was endorsed on 25 March 2022, following the conclusion of nominee candidate interviews and receipt of signed commitment letters from all selected participants.

The second decision gate (DG2) was at the end of Stage 2 when training Modules 1 and 2 were completed. Based on Module 1 and 2 Evaluation Reports and the Midway Program Effectiveness Assessment workshop (W3), DG2 was endorsed on 20 July 2022. Subsequent to DG2, an assessment of individual and collective level of learning, changes to the subsequent training modules, trainee line-up, and the delivery mechanisms were discussed and agreed upon.

1.7 OBJECTIVE OF THE REPORT

This report has two main objectives. Firstly, the report presents the outcomes of the monitoring and evaluation of Module 3 of the Targeted Capacity Building Program (namely Section 2). Secondly, the report provides an overall evaluation of the 3-module training program, including an evaluation of the programme effectiveness, lessons learned, and recommendations for further support to ensure the long-term sustainability of the Baguio FEWS (namely Section 3 and 4).

2 MONITORING AND EVALUATION



2.1 COURSE EVALUATION

2.1.1 TRAINING FORMAT

Module 3 consisted of one self-paced- and two instructor-led sub-modules. The self-paced Sub-module 3a on “Data processing for an operational FEWS” provided the participants with an advanced introduction to processing of time-series and spatial data to be used in a FEWS system. This provided the foundation for trainees to continue with Sub-module 3b, which focused on the setup and configuration of the FEWS system in MIKE OPERATIONS and the operation and maintenance of the system. A well-functioning FEWS setup in Thailand, which has run successfully for a number of years, was used as an example. The Sub-module also included hands-on exercises, where the participants had an opportunity to work with the system and its functionalities. Sub-module 3c focused on making a bridge between the theoretical and technical knowledge of FEWS and modelling software, introduced throughout the Capacity Building Program, and the FEWS system in Baguio, presented in the OTJ training sessions. This included a number of breakout rooms and discussions. The discussions focused on Baguio-specific challenges such as expected accuracy of the forecast from the Baguio FEWS, formulation and dissemination of warnings to different types of stakeholders, proposing measures to improve the future forecast, and listing activities and responsibilities for operation and maintenance of the FEWS. A summary of the sub-modules in Module 3 and their timing is provided in Table 2.1.

Table 2.1 Summary of the sub-modules and sessions conducted in Module 3.

Sub-module	Sessions	Date concluded
3a: Data processing for an operational FEWS (self-paced)	Session 1: Introduction to the self-paced course / Q&A Session 1	14/09/2022
	Session 2: Q&A	20/05/2022
3b: Advanced FEWS configuration, MIKE OPERATIONS (Instructor-led)	Session 1	06/10/2022
	Session 2	11/10/2022
	Session 3	13/10/2022
	Session 4	18/10/2022
3c: Flood Risk Dissemination Track (Expert Advice)	Session 1	26/10/2022
	Session 2	28/10/2022

Source: Ramboll

2.1.2 ACTIVE PARTICIPATION

While there was almost 100% participation in all sessions in Module 1 and 2, there was slightly less participation in the sessions in Module 3, with typically 1-2 participants not able to join the sessions. It was mainly participants from the "peer group", who were not able to attend, while the staff from the "core group" were present in most sessions. To ensure proper planning and blocking of requisite time within their work week to accommodate the trainings, the participants were provided with confirmed dates and times well in advance. Furthermore, the participants received the Zoom invitations in advance, and all sessions have been placed from 15.00-17.00 PHST, allowing participants to plan for and prioritize the training sessions.

During the Final Evaluation and Feedback workshop (W4) the reason why some of the participants were not able to join some of the sessions was discussed and two main reasons were mentioned: 1) November is a very busy time for the universities, 2) The fourth quarter (Q4) of the year is the busiest quarter of the year with a lot of administrative work, reporting and planning for the next financial year. When planning future training activities, this should be considered.

2.1.3 PARTICIPANT FEEDBACK

In addition to the continuous feedback dialogue with the participants during the sessions, the participants were also asked to fill out an evaluation survey following the completion of Module 3. The results of the evaluation survey are shown in Table 2.2. In the survey the participants were asked to state their level of agreement to various statements from "Strongly disagree" (=1), "Disagree" (=2), "Neutral" (=3), "Agree" (=4) to "Strongly agree" (=5). Hence, a low score indicate that they disagree on the statement, while a high score indicate that they agree on the statement.

Table 2.2 Summary of the course evaluation of Module 2. The possible scores: 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree and 5 = Strongly agree.

No	Question	Average score
1	The technical content of Module 3 was satisfactory	4.11
2	The self-paced course in Module 3a provided a good introduction to and some good tricks on data processing in relation to setup of a FEWS	4.11
3	The instructors in the instructor-led courses in Module 3 (3b & 3c) were well-qualified, and their technical knowledge and experience was adequate	4.78
4	The tasks and discussion in relation to the discussions on how to improve and maintain the FEWS were relevant and useful	4.33
5	Module 3b and not least Module 3c provided a good bridge between the general knowledge we have acquired about modelling and FEWS and the actual models and system implemented in Baguio	4.33
6	I will be able to use and apply the knowledge and skills I have acquired during Module 3 in my future professional activities	4.44
7	I would recommend my colleagues to participate in the Capacity Building Programme	4.89

As evident from Table 2.2, the feedback from the participants on Module 3 has been very positive as the score for all the answered questions is between 4 and 5 indicating that the participants either agree or strongly agree to the statements. Two of the statements has a score which is close to the maximum score, namely “The instructors in the instructor-led courses in Module 3 (3b & 3c) were well-qualified, and their technical knowledge and experience was adequate” and “I would recommend my colleagues to participate in the Capacity Building Programme”. The first two questions related to the technical content of Module 3 and the usefulness of the self-paced course have the lowest score, but their score is still above 4. The average score for all the questions is 4.43, which is slightly lower than the average score of 4.59 for Module 2, but none-the-less a very high average score for such type of survey.

During the informal discussions and evaluations throughout the module, some participants expressed that they preferred the instructor-led sub-modules more than the self-paced sub-modules; the main reason expressed, being the opportunity to interact with the instructors and the other participants. However, it was also acknowledged that the fact that the self-paced sub-modules have been easily available from the eLearning Platform, and will remain available there for quite some time, also allow the participants to as needed refresh and maintain their knowledge on the topics covered by the self-paced modules.

2.2 THE QUIZ

The participants were asked to complete a quiz at the end of Module 3. The purpose of the quiz was to assess the degree of learning derived from the sub-modules and to assess how well the result of the quiz corresponds to their self-assessment of their knowledge within the different topics (see Section 3). This is also the reason that the questions purposely cover topics related to both Module 2 and 3, as this presents an opportunity to test the topics covered in Module 2. The averaged quiz results are shown in Table 2.3.

Table 2.3 Questions asked in the quiz related to Module 2 and Module 3 and the respective percentage of correct answers. The correct answer(s) are marked with bold.

No	Question	% Correct answers
1	Runoff from a catchment area may occur as different types of flow. Which of the following flow components are fastest? 1) Overland flow , 2) Interflow or 3) Baseflow	100%
2	Which of the following terms do you associate with the hydrological cycle (Note: There may be more than one correct answer)? 1) Overland flow , 2) Climate change, 3) Infiltration , 4) Hydropower, 5) Irrigation or 6) Baseflow	85.2
3	Which type of time series ARE NEEDED if you want to RUN AND CALIBRATE a NAM model in areas with no snow? 1) Precipitation & Potential Evapotranspiration , 2) Precipitation, Temperature & Potential Evapotranspiration, or 3) Precipitation, Potential Evapotranspiration & Discharge	55.6
4	Which module(s) in MIKE HYDRO River do you need to run the NAM model? 1) Rainfall runoff & Hydrodynamic, 2) Rainfall runoff , 3) Hydrodynamic, or 4) Rainfall runoff & Data assimilation	77.8
5	Which of the following equations does MIKE HYDRO River solve? 1) Navier-Stokes equation, 2) Saint-Venant equations , or 3) Reynolds-averaged shallow water equations	88.9
6	Is it possible to visualize longitudinal profiles and cross-section animations? 1) No, it is not, 2) Yes, it is, but only in MIKE View , or 3) Yes, it is, in MIKE HYDRO River as well as in MIKE VIEW	66.7
7	Why is it important to have Standard Operation Procedures for the FEWS (Note: there may be more than one correct answer)? 1) To carry out operations correctly and always in the same manner , 2) To continue to achieving efficiency, quality output, and uniformity of performance , 3) To reduce miscommunication and failure to comply with standards	74.1
8	Which of the following type of data is used for data assimilation in relation to flood forecasting? 1) Discharge , 2) Temperature, 3) Potential Evapotranspiration	100.0
9	What is the backend of the MIKE OPERATIONS Web called? 1) MIKE HYDRO River, 2) MIKE Workbench , 3) NAM Rainfall-Runoff model	88.9
10	Which of these Managers do not exist in MIKE WORKBENCH (Note : there may be more than one correct answer)? 1) Time Series Manager, 2) GIS Manager, 3) Hydropower Manager , 4) Job Manager, 5) Weather Forecast Manager	64.8
11	Which of these types of data is not spatial data? 1) Vector data, 2) Raster data, 3) Time series data	100.0

A few comments to the quiz results:

1. Taking into consideration that none of the core group members have any background in hydrology, hydraulics or modelling and never have worked with the NAM, the MIKE HYDRO Basin model or MIKE OPERATIONS before, it is very encouraging to see how high the correct response rate is.
2. The average correct response rate is 82%, and for three of the questions the correct response rate is 100%.
3. The difficulty of the questions vary and some of them can be a bit tricky. An example is question 7 where all the answers are correct and where the options are more qualitative. For this particular question many of the participants had selected only two of the three options.
4. It is a bit surprising that question 3 had the lowest correct response rate. The reason for this could be, that time has passed since the participants completed the NAM self-paced course. This underlines the need to continuously work with the modelling tools and redo the self-paced exercises from time to time to get the routine and maintain the knowledge and expertise.
5. The first two questions in the quiz were also asked to the participants in Module 2. This was done with the purpose of assessing whether their knowledge has improved.
6. When looking at the responses of the individual participants, the IT staff with little educational background in hydrology and hydraulics had a surprisingly high correct response rate, which was in many cases almost similar to those from the peer group with a stronger educational background in hydrology and/or hydraulics. This was not the case in the quizzes in Module 1 and Module 2. This demonstrates the program effectiveness and benefits from the online modules and underlines the importance of being in an environment with colleagues who possess such backgrounds and deepened knowledge of the subject areas.

3 OVERALL COURSE EVALUATION AND PROGRAM EFFECTIVENESS



3.1 OVERALL COURSE EVALUATION

Continuous learning and adaptation, via extensive participant dialogue, feedback and evaluation of the training (e.g., content, format, etc.) throughout execution, has been an integral part of the program delivery, in effort to maximize overall effectiveness.

To ensure that the content (i.e., the technical level) and the format of the training was suitable for the participants, the lead trainers of DHI and Ramboll have prioritized continuous informal dialogue with the participants, adapting to the needs, wishes, and suggestions of the participants along the way.

In addition to the feedback dialogue with the participants during the sessions, the participants were asked to fill out an evaluation forms during and/or after the end of each of the three modules to provide feedback on the specific sub-modules. This evaluation further supported efforts aimed at continuous improvement and program adaptation with the aim of ensuring that the expectations of participants were met to the greatest extent possible.

The results of the evaluation surveys for all the three modules, as described in this report for Module 3 and the two previous evaluation reports for Module 1 and 2, have shown that the level of satisfaction among the participants has been very high and that all participants, generally speaking, have been very happy with the training. Figure 3.1 shows the degree of agreement among participants to three key statements after the end of each of the three modules.

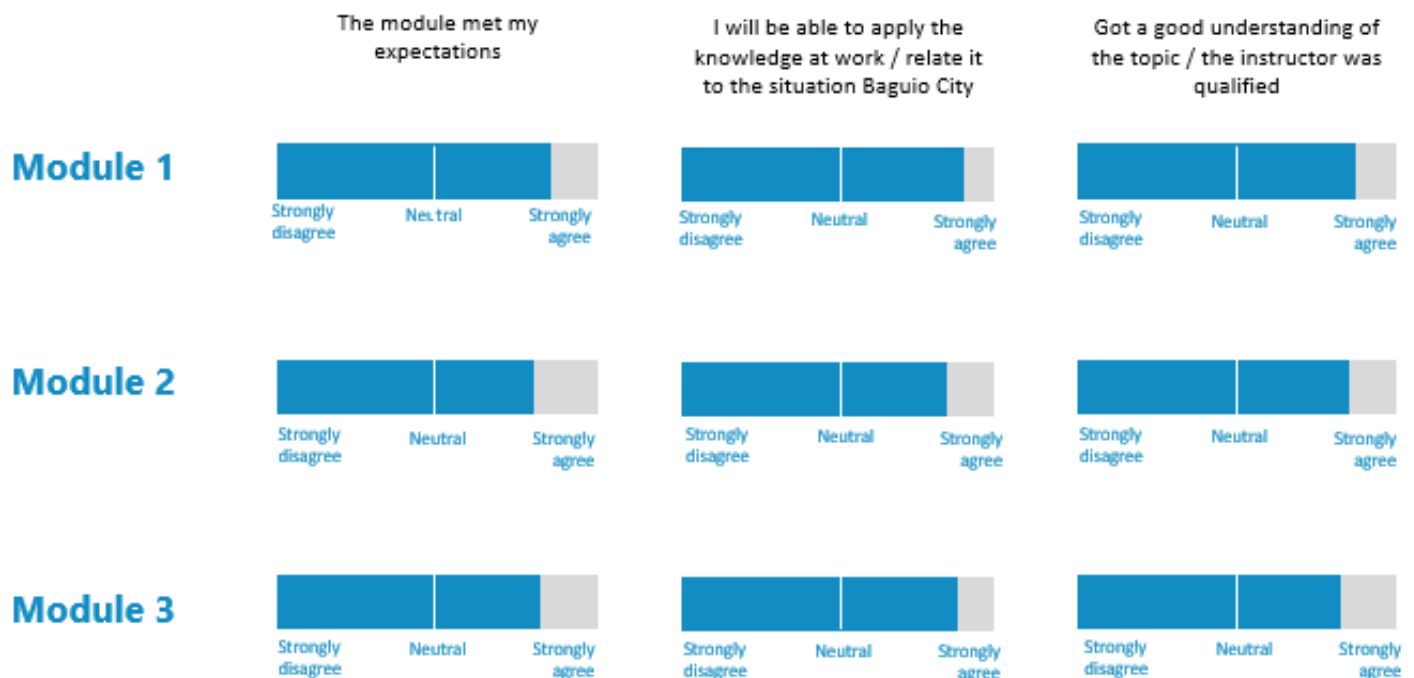


Figure 3.1 The participants response to three key statements presented to them after each of the three modules. For all three statements they responded positive that they “agreed” to “strongly agreed” in the statements when asked after each of the three modules.

After each of the three modules their responses to the three key statements ranged from “agree” to “strongly agree” that 1) The modules met their expectations, 2) They will be able to apply the knowledge and relate it to the situation in Baguio, and 3) They got a good understanding of the topics and that the instructors were qualified. The single statement which on average got the highest score after each module was “The instructors in the instructor-led courses were well-qualified, and their technical knowledge and experience was adequate”, with a score of 4.55, 4.80 and 4.78 in the three modules which is close to the maximum score of 5 (= “strongly agree”).

Figure 3.2 shows the results of eight statements presented to the participants in the final evaluation of the programme. It is seen that most of the statements get at score of around 85-90% indicating a high level of satisfaction with the different aspects of the training.

One of the statements with the highest score is “The Capacity Building sessions prepared me well for the OTJ training” and “I acknowledge that they increased the outcome of the OTJ sessions” with a score above 90%. This is positive as this was a key purpose of the 3-module online capacity building program. In the feedback sessions, the trainees also acknowledged that the outcome of the OTJ training was strengthened due to the online Capacity Building Program activities; a sentiment that was echoed by the project team leading the OTJ training.

The statement with the lowest score is “the time required for the program was sustainable based on my other work commitments”. During Module 3, it became apparent that it was difficult for all participants to prioritize all sessions due to other commitments and high level of activities towards the end of the year. However, there was still a very high level of participation and for Module 1 and Module 2 there was in fact 100% participation in all sessions except from one, which must be considered as quite exceptional and demonstrates the high level of commitment from the trainees. A number of factors facilitated this high level of participation: (i) prior to the start of the training a commitment letter was signed wherein the time input requirements (which were elaborated and clearly set out across the implementation period by Ramboll/DHI covering both the targeted training and the OTJ training periods) were acknowledged and confirmed by the participants, (ii) commitment letters were co-signed by the participants managers, and (iii) ahead of the training, the date and time for each session was sent to the participants to allow for proper planning and allocation of requisite time within their work week to accommodate the trainings. Furthermore, they received the Zoom invitations well in advance, and all sessions have been placed from 15.00-17.00 PHST, allowing participants to plan for and prioritize the training sessions.

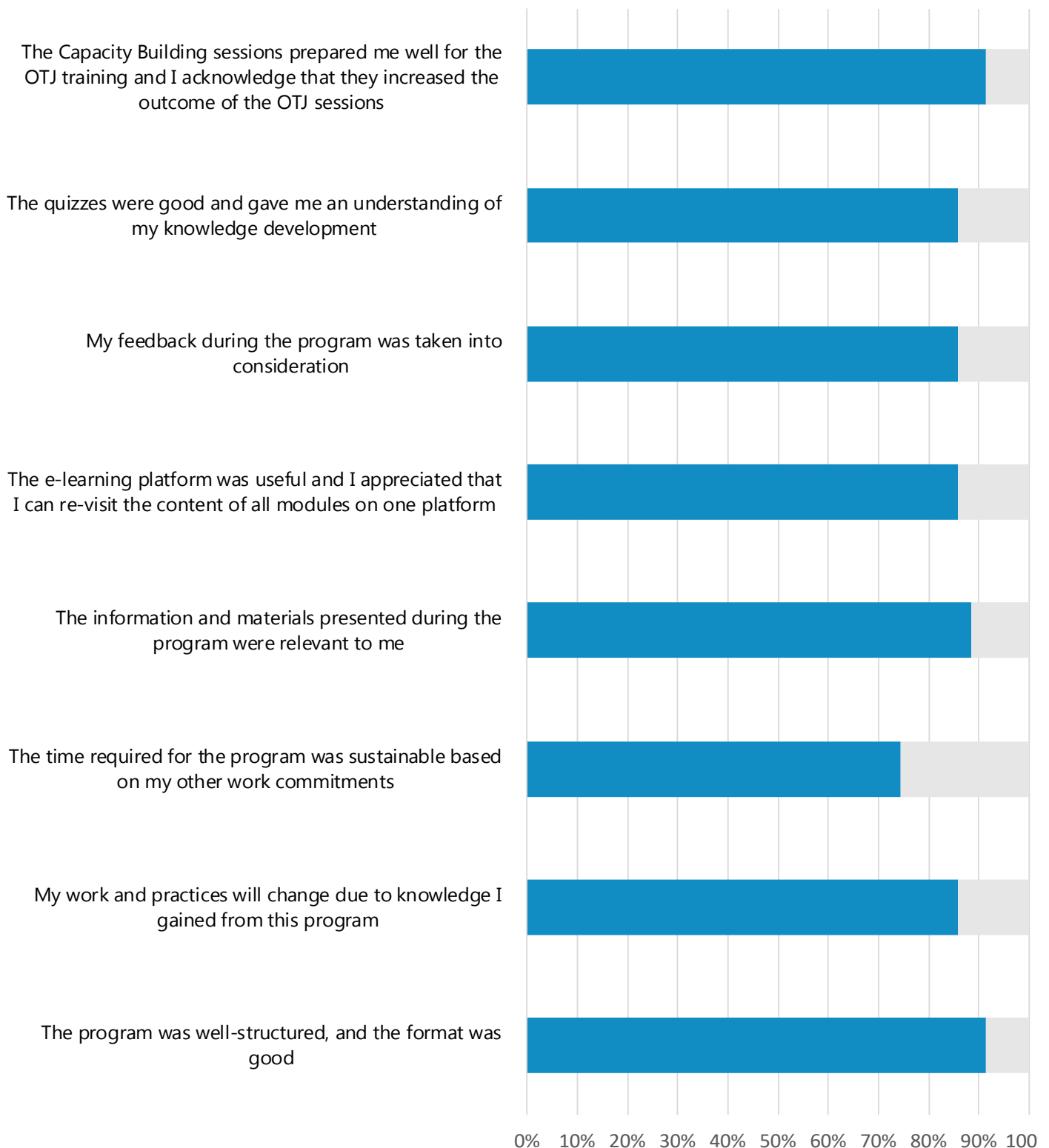


Figure 3.2 The participants response to statements presented to them prior to the final evaluation workshop. For all the statements their score is around 85-90% except one which is around 70%.

3.2 TRAINING PROGRAM EFFECTIVENESS

The key objective of the 3-module online training programme was to provide the participants with fundamental knowledge and understanding of topics and tools to be used to setup, operate and maintain the FEWS for Baguio, thereby complementing and making the OTJ training more efficient and effective.

To monitor the program effectiveness, a Baseline Knowledge Assessment was carried out prior to the start of the training program to garner a proper understanding of the participants existing knowledge and skills related to the planned topics of the training modules. This assessment was based on their self-assessment. To monitor their skill development and confidence building in the relevant topics a Midway Knowledge Assessment was carried out after the completion of Module 2 and a Final Knowledge Assessment was carried out in relation to the Final Evaluation Survey after the completion of Module 3. Thus, by comparing the three knowledge assessment surveys, it is possible to assess how the trainees have gained knowledge and experience during the training course and thereby measure the Program Effectiveness. Figure 3.3 and Figure 3.4 show the participants self-assessment of their knowledge prior to the training (light blue), after the completion of Module 2 (dark blue) and after the completion of Module 3 (yellow).

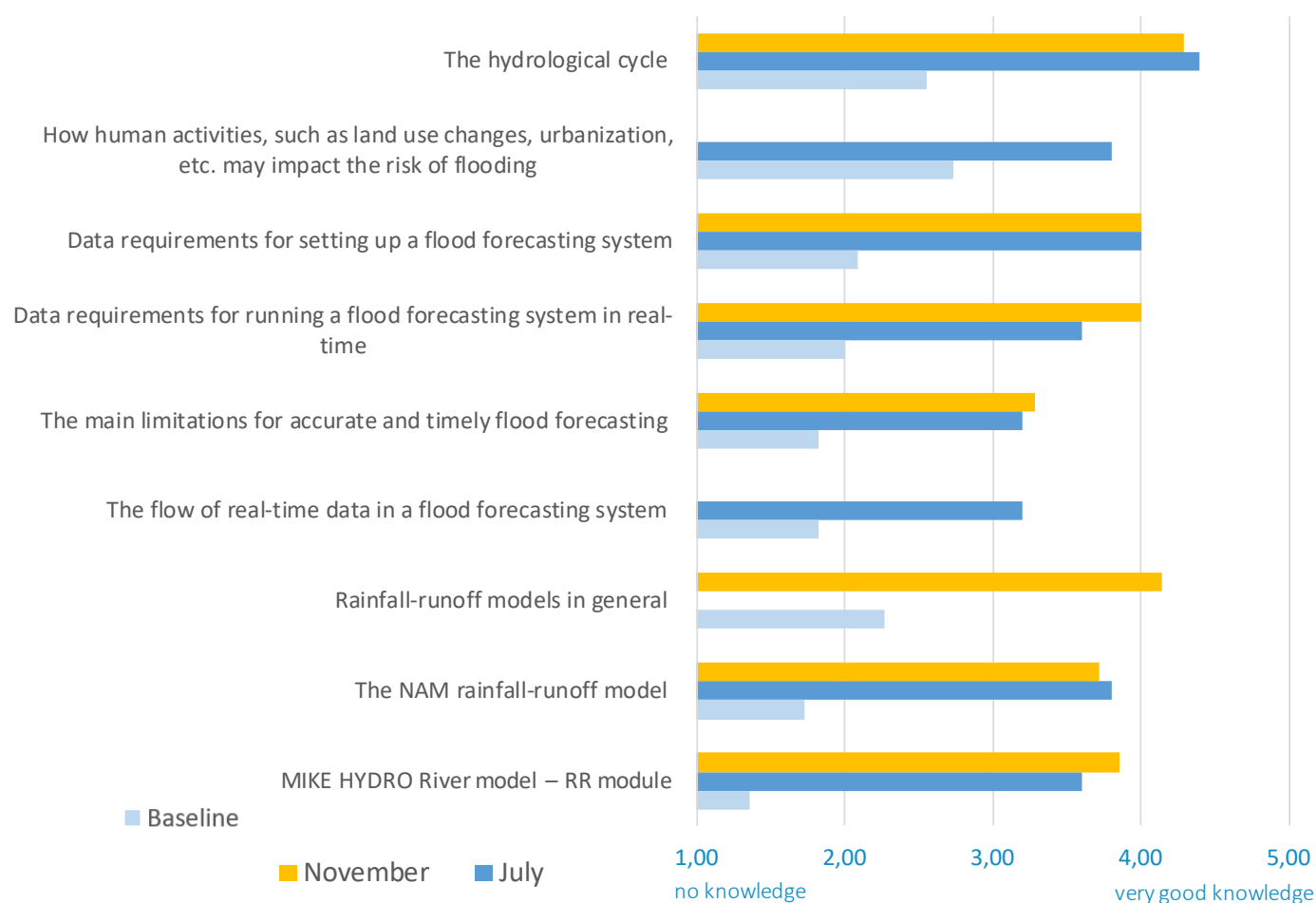


Figure 3.3 Comparison of Baseline (light blue), Midway (dark blue) and Final (yellow) Knowledge Assessment of the participants – Part I. There is a clear increase in knowledge from the start to the end of the project. 1 = no knowledge, 2 = limited knowledge, 3 = some knowledge, 4 = good knowledge, and 5 = very good knowledge.

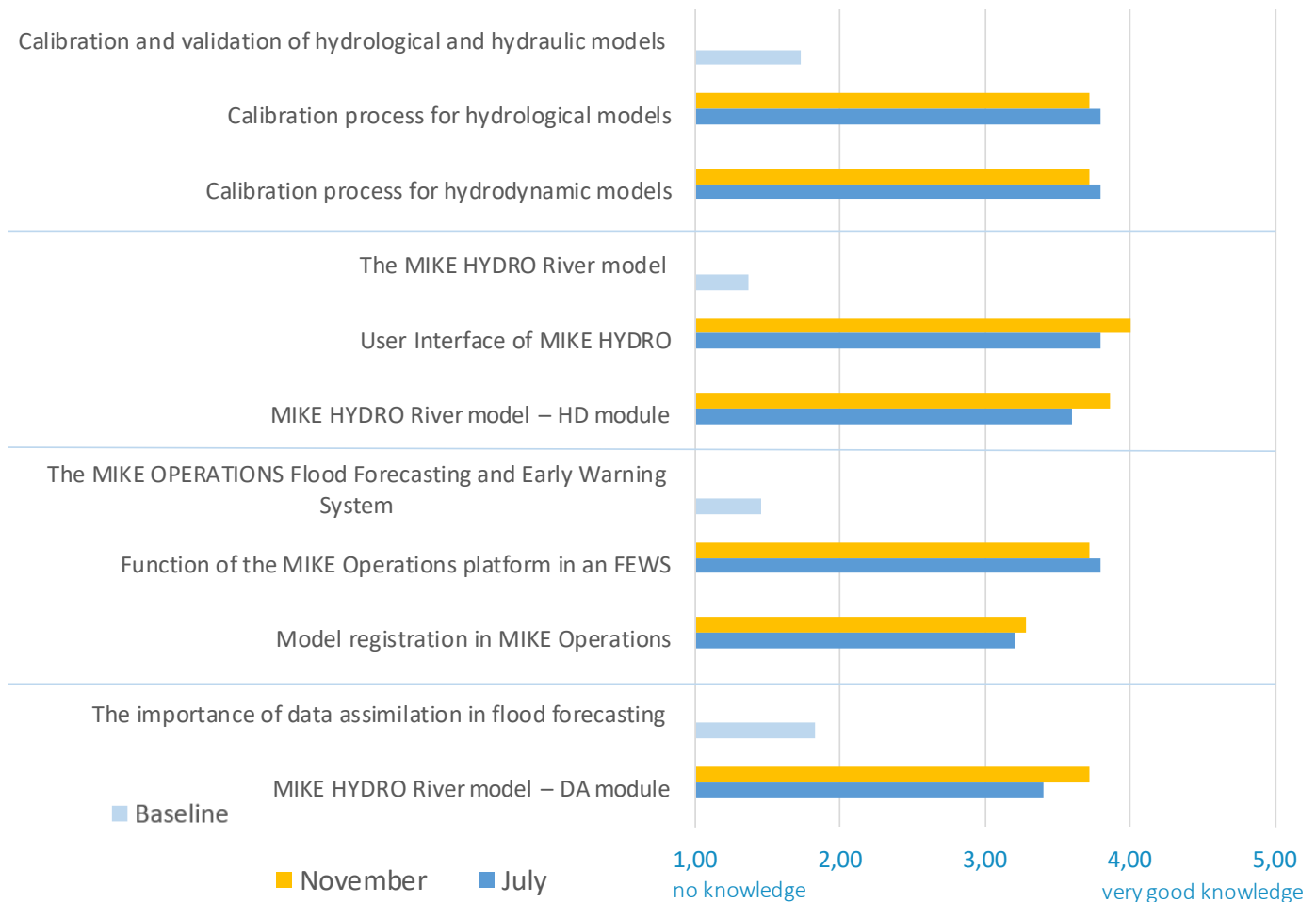


Figure 3.4 Comparison of Baseline (light blue), Midway (dark blue) and Final (yellow) Knowledge Assessment by the participants – Part II. There is a clear increase in knowledge from the start to the end of the project. 1 = no knowledge, 2 = limited knowledge, 3 = some knowledge, 4 = good knowledge, and 5 = very good knowledge

Figures 3.3 and 3.4 show that most of the participants prior to the start of the training had 'no knowledge' or 'limited knowledge' within the fields of hydrology, hydraulics, the modelling tools and MIKE OPERATIONS which are core elements of the new FEWS system established in Baguio. This confirms the participant assessment during the interviews prior to the start of the training.

The figures also show that the participants, on average, have had a steep learning curve as they for most of the topics have gained 'some knowledge' or 'good knowledge' of most of the topics, models and tools after Module 2 (dark blue) and Module 3 (yellow). This is very positive and indicates that the training program has been very effective.

It should be noted, that there is limited increase for most of the topics from the Midway Assessment to the Final Assessment and in some cases, there is even a slight decrease from the Midway Assessment to the Final Assessment. While this, at first hand, may look surprising there are possible explanations for this. Knowledge of the calibration process for hydrological and hydraulic models has decreased slightly from Module 2 to Module 3. These topics were covered in Module 2, after which the Midway Assessment was completed meaning that the trainees had these exercises and topics more front of mind at that time.

Following Module 3, the training on calibration would be further away, as time had passed. It should also be noted, that it is difficult to increase the knowledge level from “good” to “very good” and one should not expect to reach a “very good” knowledge level during a 3-module training program. A very good knowledge level is mainly reached when working with a certain topic or tools on a regular basis. The purpose of the training has been to introduce the participants to new topics relevant for them in relation to the new FEWS in Baguio. The achievement that, within all topics, the average participant has gained at least “some knowledge” or “good knowledge” is deemed highly satisfactory.

The quizzes served as another way to measure program effectiveness and can also serve to validate the trainees’ self-assessments of their knowledge level. In general, the correct response rates to the quizzes have been high, with an average correct response rate of close to or above 80% as shown in Figure 3.5. This underlines that the participants have gained knowledge within the topics covered by the program.

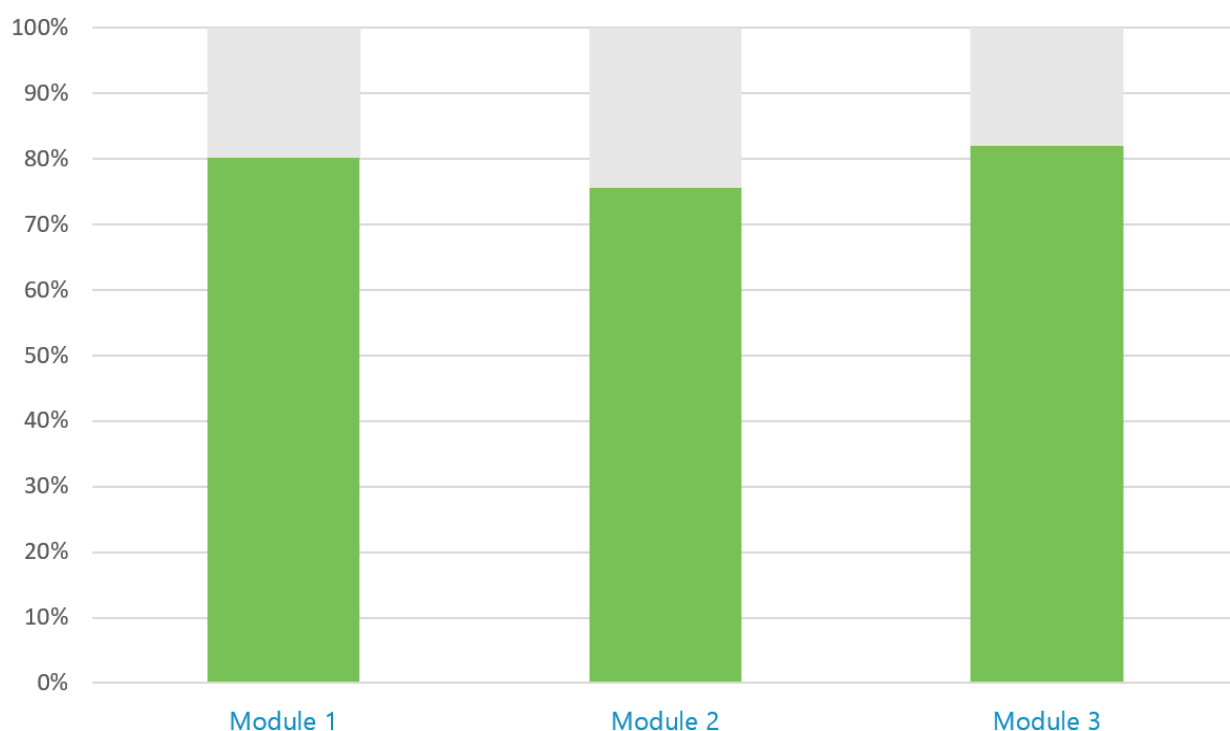
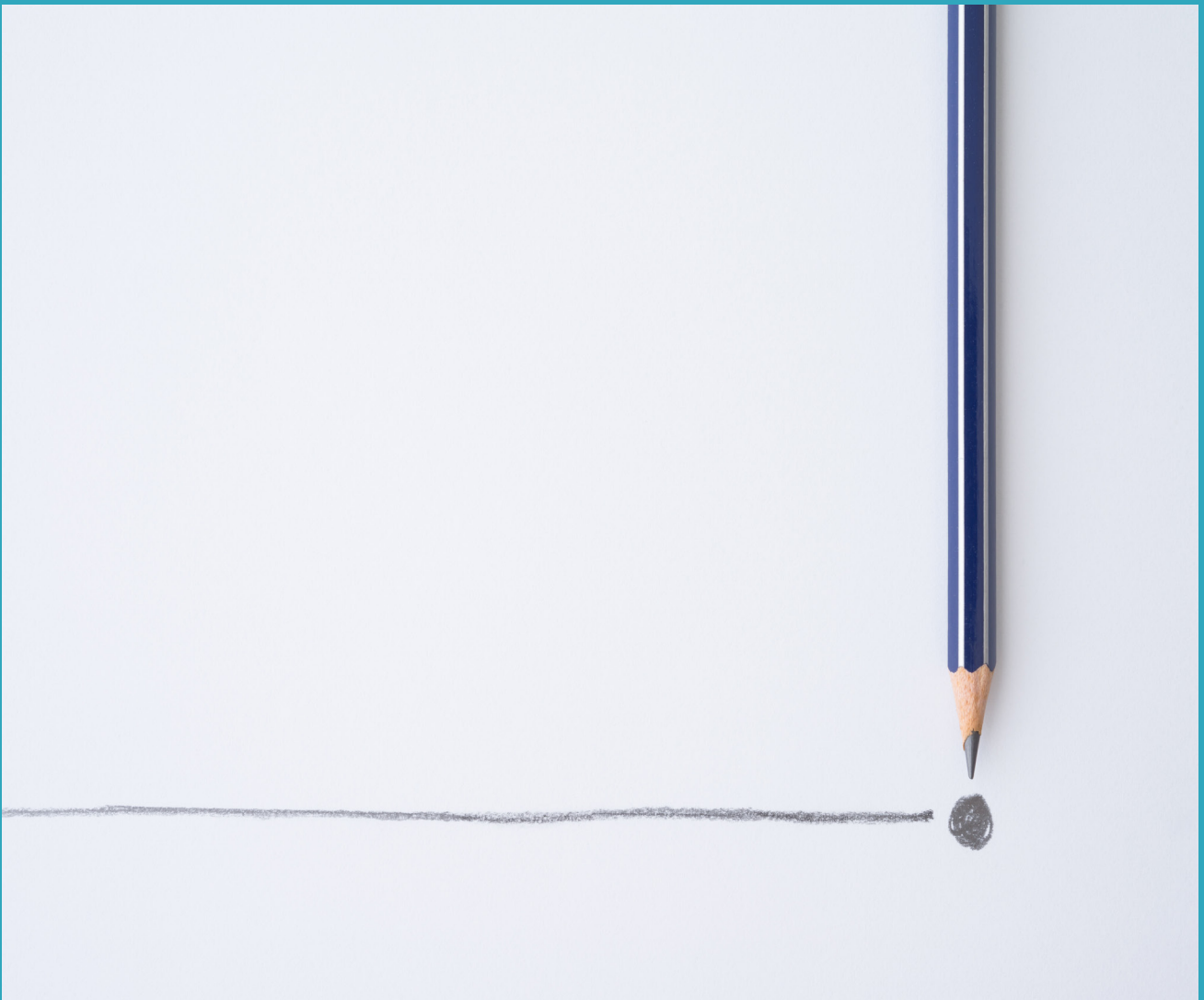


Figure 3.5. The average correct response rate in the quizzes in Module 1, Module 2 and Module 3.

An online course cannot achieve the same result and impact as an OTJ training taking place in-person in Baguio. However, it has complemented the OTJ training well as also confirmed by the participants (cf. Figure 3.2) and the experts leading the OTJ training alike. By introducing the trainees to new terms, facilitating instructor-led and self-paced courses to enhance their knowledge of the models and tools, the outcome and efficiency as well as effectiveness of the OTJ training was increased as the participants were familiar with the terms, models and tools.



4 CONCLUSIONS AND RECOMMENDATIONS



The following are the key lessons learned and recommendations stemming from the conclusion of the program:

1. **Interview of participants:** The interview with participants prior to the start of the training programme was very useful, as such provided valuable insights and information about educational background and experience in relation to the planned topics to be covered during the training. Thus, it contributed to planning the content, the technical level, and format of the training, and allowed for adaptation to the existing knowledge and experience of the participants.
2. **Baseline Knowledge Assessment:** The Baseline Knowledge Assessment combined with the Midway and Final Knowledge Assessment was a good and quantifiable method to ultimately measure program effectiveness. In addition, the quizzes contributed to validating the knowledge assessment and uptake.
3. **eLearning Platform:** The ACADEMY by DHI eLearning Platform highly facilitated the training by providing a user-friendly platform where the participants could (and will for an extended time) find all the materials for the instructor-led courses, such as pre-reading material, exercises, PowerPoints, recordings from the sessions, etc. The eLearning platform is also utilized for the self-paced courses as well as quizzes and evaluations. It is recommended to continue the use of this platform or similar platforms in future capacity building activities and trainings.
4. **Online training courses can effectively enhance the outcome of OTJ training sessions:** The online training course has successfully raised the level of knowledge and experience among the participants. Furthermore, it has complemented and “kick-started” the OTJ training, increasing the outcome of the training program and local capacity. As online courses are less costly to implement and facilitate compared to in-person OTJ training, it is a cost-effective way to supplement the OTJ training. Thus, the two training approaches compliment each other very well. However, it should be noted, based on participant feedback and observations from trainers, that in-person OTJ training is necessary and a highly effective training format.
5. **Maintaining the knowledge and experience:** One key challenge with all training is that knowledge and experience slowly “evaporates” if the participants do not use their skills and knowledge on a regular basis. The future involvement of the trainees in the operation and maintenance of the FEWS will hopefully ensure that they will use and expand upon their already gained knowledge and experience. As all the materials from the training, including the self-paced courses will remain on the eLearning Platform in the coming year, the participants are encouraged to redo the self-paced courses from time to time, preferably together as a group, to ensure that they maintain and reinforce their knowledge and experience.
6. **Need for a consolidation phase:** The Targeted Capacity Building Program, including this 3-module training program and OTJ training, is crucially important for the sustainability of the FEWS project. However, there will be a need for a consolidation phase with substantial expert support after the completion of this project for number of reasons: (i) while the participants have gained substantial knowledge and experience during the capacity building program, the core group members have had limited experiential learning and opportunities for applying their new knowledge, hence, it has not been possible for the participants to reach a level of understanding where they will be able to operate and maintain the FEWS independently as yet, and (ii) the trainees have not yet had a chance to complete a full-scale test of the FEWS system nor have they obtained the necessary routine to operate and maintain this complicated system.

ABOUT THE ASEAN AUSTRALIA SMART CITIES TRUST FUND

The ASEAN Australia Smart Cities Trust Fund (AASCTF) assists ASEAN cities in enhancing their planning systems, service delivery, and financial management by developing and testing appropriate digital urban solutions and systems. By working with cities, AASCTF facilitates their transformation to become more livable, resilient, and inclusive, while in the process identifying scalable best and next practices to be replicated across cities in Asia and the Pacific.



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