

# Monday Afternoon Discussion

(Open Problem Session)

## Discussion Items (list)

Participants engaged in a brainstorming session. The discussion was around the following topics. (You can see photos of the live notes taken [in this folder](#))

1. a) What are the “other tools”?  
b) Open source only?
  - Free to use only?
  - Total cost of ownership?
  - Open access vs open source
  - Risk of owner changes
2. a) How can the tools change the systems:
  - When assessment occurs
  - How people limit
  - Are students ready for a change?
  - Is anyone ready?b) The tool vs how we use it:
  - Adoption vs implementation
  - Underlying theory vs the software vs the communityc) Barriers to adoption?
- d) Can online assessment interpret unconventional phrasing?
3. Technology as it relates to how we motivate students
4. How to gather and share data?
  - Why do we want the data?
  - What are the questions?
    - Is the error due to a lack of prior knowledge?
    - How can technology detect and adapt to such errors?
  - combining data
5. How to give input as the technology is developed?
  - What studies will help to answer that question?
6. How to structure feedback to improve learning?
  - What studies will help to answer that question?
7. a) How can I structure my work so that it is transferable?  
b) How to do better than “top down” (i.e. just sharing a course packet)  
c) How to connect across apparently similar courses?
  - Interoperability, e.g. of questions
8. Same as 7, but for data
9. a) How to have students work together?
  - Technology enables group interaction

- Group interaction is a strict subset of collaboration
  - b) Collaboration among instructors
  - c) Student involvement in content creation
10. How to ensure the student provided the answer? “Authenticity”
    - Some answers are self-assessing (i.e. “does this work”)
  11. Are we convinced that Stack actually works?
    - Another variable: how do students actually use the tool? (e.g. are they being goofy)
    - Stack plays different roles at different institutions
  12. Longitudinal study (individuals, cohorts)
    - Goal: find best practices
  13. Exams (weights vary)
    - Alignment of final exam with mid-course assessment (in content and format)
  14. Do short online assessments impair later long-form work?
    - Connect to questions about collaborative work (communication changes how you think)
  15. Relate (any!) questions to the students’ long term goals
  16. Does the technology put distance between the student and instructor?
  17. Think in terms of suites of tools
  18. a) Community of Stack users
    - b) Do instructors without stats knowledge understand what Stack is doing?
      - Make a more accessible dashboard
      - Better: make a good report
  19. How does Stack change instruction? How does Stack reinforce instruction?
  20. Understand what type of engagement the technology enhances/supports
  21. Positive use of AI?
  22. a) PD for instructors, on the use of online tools
    - b) What other support is needed?
  23. What stops other lecturers from using online assessment tools?
  24. How to encourage collaboration when it is a competition?
  25. The mistaken impression that active learning does not cover enough material (counteract the “curriculum focus”)
  26. Accessibility of online tools for special needs
  27. Certification of student knowledge (outside of formal courses)
  28. Structured pedagogy (using material prepared by somebody else) at the elementary level
    - Can it be adapted to higher level?
    - When is it appropriate?
  29. Collaborative invention of mathematics (by the students)
  30. Embedding research in curriculum innovation
  31. Beyond maths (STEM? more?)
  32. Expanding to other countries
  33. Engage more people in maths education research

34. Evaluate and improve individual tasks
  - What more tasks are needed?
  - (Embedded research)
35. Problems which are not “task oriented” (e.g. not computational)
36. General principles to guide how to write a good task
37. How to tell if a particular task (positively) impacts learning
38. All assessment should provide positive reinforcement, to encourage and motivate
39. Inspire more students to like maths, and to be motivated to learn (“engagement”)
40. Engaging institutions

## Summarized Notes

### **Educational Tools and Open Source vs. Commercial Solutions**

The workshop began with a discussion on educational tools like STACK and WebWork, debating whether to focus exclusively on open-source tools. Participants distinguished between open-source tools, which can be modified, and freely available tools, which are not editable. They recognized that while open-source tools offer control over long-term costs, they still incur expenses related to servers and expertise. The focus was on ensuring that tools are not only available but also effectively implemented with proper training and support.

### **Implementation and Effectiveness**

There was a consensus that the success of educational tools depends on their implementation rather than the tools themselves. Effective use requires thoughtful integration into the curriculum, considering usability and user community. The discussion highlighted that diverse assessment methods are needed, and merely providing tools is not sufficient; critical thinking and training are essential.

### **Collaborative Problem-Solving and Tool Adaptation**

Participants explored the potential of tools designed for collaborative problem-solving, suggesting that students should be able to pass problems to peers for continued work. They emphasized the need for technologies that support group interactions and improve collaborative learning. Additionally, the importance of adapting tools based on user feedback and ensuring they meet the needs of diverse learners was highlighted.

### **Assessment and Data Utilization**

The workshop addressed the role of assessments in evaluating student learning, discussing both intrinsic assessments (where task completion itself verifies

correctness) and traditional evaluations. The need for research on the alignment between digital and traditional assessments was noted, as well as the importance of integrating meaningful research into teaching practices. Participants stressed the necessity of understanding how digital tools affect student engagement and learning outcomes.

### **Cultural and Contextual Considerations**

Participants discussed the cultural aspect of mathematics education, emphasizing the need to make math relatable and engaging through real-world scenarios. The conversation also covered the importance of contextualizing online assessments to address language and cultural differences, and how hybrid methods combining traditional and technological tools could be beneficial.

### **Professional Development and Collaboration**

The discussion included the need for professional development in using AI and other technological tools in education. Participants noted the challenges faced by educators in adopting new methods and stressed the importance of fostering a collaborative culture in education. Building support networks and addressing attitudes towards new practices were identified as crucial for effective implementation.

### **Future Directions and Research Needs**

The workshop concluded with a call for further research into the effectiveness of educational tools and assessment methods. Participants discussed the need for longitudinal studies, exploring the impact of technology on different educational contexts and demographics. They also highlighted the importance of international collaboration and the need for ongoing evaluation and refinement of educational strategies.

The workshop aimed to refine ideas into actionable projects and proposals, with a focus on future collaboration and continued development of educational practices and tools.

## **Fully Transcribed Notes**

Discussion started with highlighting the two primary tools (STACK and Web work) but questioned the potential for multiple tools to address challenges in education.

The group considered whether to focus on open source tools exclusively and if open source should be a qualifying criterion.

There was a discussion about the distinction between open source tools, which allow for code modification, and freely available tools, which may not be editable. The group aimed to clarify whether "open" means free to use or also includes the ability to edit and customize the tool.

The total cost of ownership for open source tools was addressed, noting that despite being free to use, they require servers and expertise, which can be expensive. It was acknowledged that while open source tools offer control over long-term costs, they are not completely free, and these costs must be considered by policymakers.

There was a focus on the feasibility and impact of educational interventions, particularly the use of online tools and assessments. A key point raised by Chris highlighted the challenge of ensuring these tools are responsive to students' learning needs and attainment levels. He suggested that the way we use these tools, rather than the tools themselves, significantly affects their outcomes.

It was emphasized that the tool's effectiveness depends on its implementation and the policies guiding its use. There was a consensus that simply providing the tools is insufficient; critical thinking and training on their use are essential.

Two main themes emerged: adoption and implementation. Adoption refers to whether the tool is used or not, while implementation concerns how the tool is used. Effective implementation requires considering the theoretical foundations, user-friendliness, and the community of users.

Participants agreed that technology should be designed to adapt based on feedback and be supported with appropriate training and resources. The discussion underscored the need for a comprehensive approach that considers curriculum views, software usability, and the user community.

It was highlighted that it isn't solely about open source but rather the cost of use and the implications of maintaining and supporting these tools. The importance of considering both immediate and long-term costs was emphasized for effective decision-making in educational contexts.

Furthermore, there was a discussion on the integration of lectureship positions with curriculum design, emphasizing the importance of creating transferable resources. The idea is to develop open-source course packs, such as those for linear algebra, that instructors can download and use. These resources should not only be well-packaged for use but also designed for sharing and community collaboration, allowing for feedback and continuous improvement.

A key point raised was the need for a two-way conversation in resource sharing. Instead of a top-down approach, where a package is distributed for everyone to use, the focus should be on building a collaborative loop. This involves educators contributing to and refining shared resources.

Additionally, the workshop highlighted the challenge of authoring questions, which is time-consuming for educators. There was a discussion about the interoperability of educational content across different learning systems. This includes the potential for importing and adapting course materials from one platform to another, ensuring that content is reusable and efficient.

There was a call for both technological and community-based solutions to facilitate the sharing of educational resources. The goal is to improve the quality and volume of shared content, thereby saving time and enhancing the overall educational experience.

Another discussion on accessing education data emerged and emphasized the importance of tailoring educational tools and data collection to different contexts to motivate learners effectively. This contextual approach ensures that data is representative of diverse environments, aiding in comprehensive analysis.

Participants highlighted the need for large datasets to train effective models. Collaboration with institutions is essential to gather socio-demographic information, which can enhance the utility of data for various purposes. A key question raised was the broader objectives of collecting combined data sets and the types of questions such data could help answer.

One significant barrier to technology adoption in education is the lack of adaptability to individual learner levels. Technologies often fail to identify specific areas where students struggle, unlike human teachers who can provide personalized guidance. Addressing this gap could involve using data to adapt educational technologies to meet individual learning needs more effectively.

Overall, the discussion underscored the necessity of actionable data to identify and address learning gaps, enhancing the adaptability of educational tools to support student success.

The concept of intrinsic assessment was discussed, particularly in the context of problem-solving and modeling activities. Intrinsic assessment occurs when the completion of a task inherently demonstrates its correctness. For instance, in coding, the functionality of the code serves as its own assessment—if it works, it meets the required standards. This self-assessing nature is valuable but should be one of many tools in an educational portfolio.

Discussion on authenticity and functionality highlighted that for an artifact to be considered authentic, it must function correctly. This idea challenges the traditional "us versus them" model of assessment, where an external party evaluates the work. Instead, the artifact's ability to perform its intended function serves as a measure of its authenticity and correctness.

Broadening assessment tools discussions underscored the importance of having a diverse set of assessment tools. Intrinsic assessments, while valuable, cannot stand alone. Educators should incorporate various methods to ensure comprehensive evaluation and support student learning.

There was also a discussion on the need to research the effectiveness of new educational tools, such as STACK, in enhancing student learning. Concerns were raised about potential unintended consequences of these innovations. It was suggested that thorough testing and research are necessary to understand their impact fully and to address any negative outcomes.

The interaction between students and educational tools was another key topic. The importance of structured time and focused engagement was emphasized to prevent students from rushing through tasks without understanding. The debate about the quality of online math practice compared to traditional methods was also addressed, with suggestions that research could help validate the effectiveness of online tools.

There was a consensus on the need for diverse assessment methods, careful implementation of educational innovations, and thorough research to ensure these tools positively impact student learning. The discussions highlighted the complexities of modern education and the necessity of a multifaceted approach to teaching and assessment.

Incorporating math education research at the development stage of technologies can provide valuable feedback to improve teaching and learning. One key area needing research is the development of teachers' content knowledge. For instance, understanding how to effectively teach fractions and identifying common student mistakes can be challenging. Technology can help by collecting and analyzing data on student performance, which can then be used to inform teacher training and improve instructional methods.

In the Kenyan context, the shift from a summative to a formative assessment approach under the Competency-Based Curriculum (CBC) highlights the need for better utilization of assessment data. By analyzing data from formative assessments, the government can provide feedback to teachers, helping them address specific areas of student weakness. This approach can enhance both individual and national education outcomes.

Research should also focus on the specific features of assessment tools that support student engagement with mathematical ideas. Understanding how feedback is structured and presented can be crucial. Qualitative research, such as interviewing students about their experiences, can provide insights into what supports or hinders their learning. This information can guide the design of more effective feedback mechanisms, ultimately improving student learning outcomes.

Online assessments often fail to connect with students due to contextual differences. One significant issue is the language used in these assessments, which is predominantly English. The expectations for how responses should be input can be a barrier, especially if the student's way of expressing themselves isn't aligned with conventional standards. Educators who know their students well can often infer their intended meaning, but this nuance is lost in automated online assessments.

There is a need to explore ways to bridge this gap and make online assessments more context-sensitive. One suggestion is to incorporate tools that allow for some level of interpretation or personalization based on the student's context. Additionally, innovative approaches to teaching and assessment that consider the specific context and needs of students should be developed. Hybrid methods combining traditional and technological tools could be beneficial.

Mathematics should not just be viewed as a subject but as a cultural element that influences various professions. The discussion highlighted that individuals exposed to mathematical thinking from an early age tend to excel in their fields, even if those fields are not directly related to mathematics. This cultural aspect of mathematics helps individuals develop better problem-solving skills and analytical thinking, which are valuable in any profession.

The example of using a golf ball to teach mathematics illustrates the importance of making math relatable and applicable to real-world scenarios. This approach can change students' perceptions of mathematics and make it more engaging and relevant to their lives and future careers.

Discussions here emphasized the importance of contextualizing online assessments, using hybrid methods, and promoting the cultural aspects of mathematics to enhance learning outcomes. These strategies can help bridge the gap between students' understanding and conventional assessment methods, ultimately fostering a deeper appreciation and proficiency in mathematics.

Participants discussed the potential of designing educational tools that facilitate collaborative problem-solving. One idea presented was a tool allowing students to start solving a problem individually and, if they get stuck, pass it on to a peer who continues the work. This approach would enable students to learn from each other's



problem-solving methods. The discussion emphasized shifting from technology designed for individual use to technology that supports group interactions. This shift could enhance collaboration, particularly in the context of competency-based curricula and 21st-century skills.

Collaboration in mathematics goes beyond group work; it involves students sharing and building on each other's ideas. Technologies that support this kind of interaction can foster deeper collaboration and improve learning outcomes. Participants explored the idea of involving students in content creation, not just as consumers. This approach could address language barriers and content accessibility, making learning materials more relevant and authentic. The discussions addressed the challenge of ensuring that student feedback and answers in assessments are authentic. Participants discussed the need for reliable electronic tools that accurately reflect students' understanding and performance.

The discussion highlights a key issue: the gap between current technology use and the experience of educators who may not have been trained in modern tech-based teaching methods. The focus needs to be on a holistic approach that considers the entire educational system, including policymakers, educators, and students. There is an observed resistance or lack of familiarity with new methods among educators, not necessarily due to opposition but because they have not been exposed to or trained in these modern approaches. This suggests the need for a shift in training programs for future educators to better integrate contemporary practices. The conversation also emphasized the importance of addressing attitudes and values in educational change. Successful implementation of new practices, whether technology-based or not, requires attention to the attitudes of those involved. This means incorporating these aspects into the design and deployment of educational initiatives to ensure effective adoption and application.

There were discussions revolving around how to effectively build and sustain a community around educational technologies like STACK, ensuring high adoption and ongoing development. A major concern is how educators using STACK can interpret the data analytics it provides, especially since not all users have a background in statistics. The goal is to simplify this data so that educators, regardless of their statistical expertise, can easily understand and apply the insights to address specific issues their students may face.

The question posed is how to make the analytics from tools like STACK more accessible and useful for educators. It is essential to explore ways to automate or simplify the process of interpreting and sharing insights from these tools. Additionally, understanding how these tools impact different types of engagement—emotional, cognitive, and behavioral—is important. This includes examining whether these tools affect engagement levels differently and using this understanding to guide future improvements.

In summary, the discussion sought to address how to enhance the usability of educational tools and the analytics they provide, focusing on improving their accessibility for educators and understanding their impact on student engagement.

Again, the discussions highlighted several key issues around communication and student engagement in educational settings. One notable point was the impact of transitioning to digital tools on student-instructor relationships. An example mentioned was about how a professor shared that switching to online homework submissions reduced their familiarity with student names, demonstrating how technology can affect personal interactions.

Discussions emphasized the importance of maintaining student interaction, even when integrating new technological tools. It was argued that while digital tools can enhance learning, they should not replace face-to-face engagement. This balance is critical to ensuring students feel heard and supported.

Participants suggested that instead of relying on a single comprehensive tool, a suite of complementary tools might better address various educational needs. This approach allows instructors to choose the most appropriate tools for quizzes, group work, assessments, and content delivery based on their specific class context.

One proposed strategy was using tools to foster student interaction and collaboration, where students receive additional points for helping their peers. This method encourages active participation and peer support, contributing to a more dynamic learning environment.

The discussion concluded with a call for a stable, long-term platform for educators to share and receive feedback on the effective use of technological tools. This platform could help educators adapt and improve their teaching strategies, ensuring that technology enhances rather than detracts from the learning experience.

Discussions further highlighted the effectiveness of structured pedagogical activities for teachers. By following well-designed activities step-by-step, even less experienced teachers can see improvements in teaching and learning outcomes. However, this approach may limit opportunities for innovation and creativity, which could be a drawback for confident teachers looking to enhance their sessions further.

A key topic was the concept of "collaboratively invented mathematics," where students use digital tools to collaboratively discover mathematical concepts, such as the Taylor series. This method shifts from traditional pedagogy to a more engaging, exploratory approach, allowing students to invent mathematics that historically took centuries to develop.

There was a strong emphasis on embedding meaningful research into teaching practices. This includes designing assessments with digital tools to evaluate students' understanding effectively. The integration of research can inform educational innovations and improve teaching methodologies.

Participants also discussed the importance of international collaboration in mathematics education. Countries interested in adopting these innovative teaching methods need support to integrate and implement them effectively. The potential for using online tools to facilitate these collaborations was considered crucial for broadening the impact of these educational innovations.

It was then concluded from this discourse that structured pedagogy can significantly improve teaching outcomes, but there is a need to balance this with opportunities for teacher innovation. The collaborative invention of mathematics and embedding research into teaching practices were highlighted as promising approaches. Global collaboration and effective implementation of these methods are essential for their success.

A participant had mentioned the need to discuss the positive uses of AI in teaching and its potential benefits. Participants highlighted the importance of professional development for lecturers and teachers to effectively use AI tools, including both pre-service and in-service training.

A concern was raised about why only a few lecturers consistently use new technological tools while others do not. The discussion also explored the support available for African institutions wishing to adopt technology in teaching. Building support networks and fostering collaborative learning were identified as crucial elements.

The conversation noted that education systems often promote individualism over collaboration. This mentality persists into higher education and research, making collaboration challenging. Encouraging a culture of helping and sharing knowledge from a young age was seen as vital.

Also, it was mentioned that some teachers appreciated innovative teaching methods that do not rely on technology but expressed concerns about time constraints. They feared that creative teaching methods might reduce the amount of content covered during class. The group questioned ways to balance innovative teaching with curriculum requirements, aiming to inspire students to explore concepts independently.

One issue discussed was the alignment between final exam results and outcomes from online assessments. The concern is whether traditional exams provide the same results as digital formative assessments. This disparity could be an interesting

research question, particularly in contexts like the Open University, where online assessments are prevalent. Understanding how long-term use of digital tools affects mathematical communication and writing could be another research avenue.

A key point raised was the relationship between formative assessments and traditional examinations. There is interest in researching how these different forms of assessment align with each other, especially if one is digitized and the other is not. This could reveal important insights into the effectiveness and consistency of various assessment methods.

Another discussion topic was the role of digital tools in enhancing or hindering mathematical communication. The group considered how these tools impact students' abilities to communicate mathematical ideas effectively. There was a suggestion to explore ways to leverage student collaboration to improve communication skills, potentially by rewarding students for explaining concepts to peers.

The conversation also touched on how improving collaborative learning can simultaneously enhance mathematical communication skills. Encouraging students to work together and explain their reasoning can create a virtuous cycle of improved communication and understanding. This approach could be beneficial in fostering both collaboration and competency in mathematics.

Finally, participants highlighted the need to understand different levels of mathematical education. From high school students aiming for basic competency to those pursuing careers in mathematics, it's important to consider how various tools and methods support different educational goals. This broader understanding can help tailor educational strategies to meet diverse student needs.

The math education researchers discussed the importance of building capacity among mathematicians who currently teach but may lack certain skills. This involves engaging more individuals in math education research beyond just the math education researchers.

Participants considered conducting a research project aimed at improving the quality of math tasks. This includes identifying the best and worst tasks and determining where new tasks should be developed. Research on individual tasks can help pinpoint those that are most effective. There are challenges in designing tasks for certain areas of mathematics, such as abstract algebra and geometry. The discussion covered the need to create effective tasks that go beyond simple calculations and consider the specific content of each course. An idea was proposed to identify a set of principles for designing good tasks that promote learning, regardless of the course context. For instance, out of 200 derivative problems, finding the top 20 that best promote learning.

The workshop emphasized the importance of maintaining the human element in assessments. Positive reinforcement can generate new ideas and support students effectively. One participant shared their teaching approach, which involves assigning seminar topics to groups of students. These groups work on their topics throughout the semester and present their findings, fostering collaboration and deeper understanding.

During the workshop, discussions focused on the integration of education technology and its impact on student learning. One key point raised was the need to assess whether these technologies are genuinely beneficial or potentially harmful. Although initial plans to collaborate with a math education researcher were not realized in time, the intention is to pilot the technology with first-year students and conduct a follow-up assessment in the second year.

Participants emphasized the importance of understanding the distinct roles education technology plays in different institutional contexts, such as CalTech versus other universities. This understanding is crucial for determining the effectiveness of such technologies in enhancing learning experiences.

Another significant idea was the implementation of longitudinal studies to track student progress over several years. These studies could help identify best practices and measure the long-term impact of education technologies on learning outcomes. For example, tracking the same cohort of students through a four-year degree program could reveal valuable insights into their learning journeys.

The workshop also highlighted the potential to investigate specific issues, such as gender disparities in STEM fields. By comparing data from different universities and contexts, researchers could analyze how online tools and other interventions influence retention rates and learning experiences for different student demographics.

In conclusion, the discussions underscored the need for rigorous educational research to identify effective practices and understand how various factors influence student learning across different contexts.

Discussions highlighted the tendency to treat students as a homogenous group, which overlooks individual progress. Mary raised a point about the uniform speed of student progress enforced by current assessment systems. Unlike learning to drive in the UK, where individuals take their driving test when ready, school exams are scheduled uniformly for all students. This system's rigidity does not account for individual readiness and progress. The conversation explored the potential of electronic assessment tools to transform not only learning but also assessment systems. The current system, rooted in historical practices, necessitates uniform exam schedules. Electronic tools, however, offer the flexibility to tailor assessments

to individual progress, potentially leading to a more personalized and effective education system.

Mary's quote about play sparked a discussion on the nature of compulsory participation. True play requires freedom—emotional, economic, and choice freedom. Compulsory education systems often lack these freedoms, making participation feel forced. The group pondered whether new tools could introduce more freedom and playfulness into learning, thereby enhancing engagement and effectiveness.

The discussion extended to the broader implications of changing educational systems. It was suggested that learning could be more context-specific and playful, integrating disciplines in meaningful ways. For instance, learning math through historical contexts could make it more relevant and engaging for students.

A key concern was whether stakeholders—students, educators, institutions, and societies—are ready for such a transformation. The readiness in terms of attitude, capacity, and resources was questioned, especially considering the challenges faced by educational systems in regions like Africa. The discussion concluded with a call to assess the readiness and willingness of all stakeholders to transition from traditional to technology-integrated assessments.

The workshop highlighted a critical distinction between commercial and open-source solutions, particularly concerning future cost implications. Participants debated whether the focus should be on Open Access or open-source terms, considering their impact on accessibility and contribution rights.

A key point raised was the risk of relying on commercial software that might become costly or inaccessible if terms change. In contrast, open-source software offers more stability and control, allowing modifications and reducing dependency on external vendors.

The discussion also touched on the need to understand how open-source principles could inform educational software choices. The idea is to draw from the open community's experiences to determine what makes software truly open and sustainable.

Participants expressed interest in identifying qualifying criteria for evaluating different software options. The upcoming sessions will aim to clarify these criteria, explore alternative platforms, and discuss their functionalities to make informed decisions.

Overall, there is a call to explore how open-source and open-access principles can better serve educational institutions and to determine the most suitable approach based on their needs and trade-offs.

Another discussion highlighted the tension between competitive academic systems and the need for collaboration. There is a concern about how to foster collaboration from a young age within a system that traditionally emphasizes competition. This raises questions about how competitive academic structures can adapt to support collaborative learning.

It was noted that shifting teaching approaches might not require technology but a change from a strict curriculum focus. Teachers accustomed to curriculum-based instruction may struggle to integrate new methods. The question arises whether these new approaches can fit within the existing curriculum or if they require a complete overhaul.

The conversation addressed the need to adapt digital tools for students with special needs. Ensuring that digital educational resources are accessible to all learners is crucial, and there is interest in how these tools can be modified to meet the needs of individuals with disabilities.

A question was raised about whether students could receive certification for completing modules from open educational resources outside traditional institutions. This discussion explores the potential for recognizing and certifying informal or self-directed learning experiences.

Recent evidence suggests that structured pedagogy, which includes detailed lesson plans and specific instructional strategies, improves teaching and learning at foundational levels. The inquiry is whether similar structured approaches could enhance education at higher levels, combining structured methods with more advanced pedagogical strategies.

The discussion highlighted the importance of exploring alternative assessment methods beyond digital tools. Emphasis was placed on incorporating human interactions and experiences, which are often difficult to quantify. These assessments should inspire and motivate rather than merely evaluate.

There is a need for online tools that not only assess but also engage and inspire users. This involves considering how institutions can be involved in data sharing agreements and fostering better engagement at an institutional level, rather than focusing solely on individuals.

As the session concluded, there was a brief discussion on record-keeping and the need for capturing high-speed data. The final points stressed were the importance of integrating motivational aspects into assessments and the need for institutional involvement in data sharing.

The workshop aims to explore and develop a variety of significant and well-considered ideas. Participants will engage in open-ended discussions and

collaborative activities to refine these ideas. The goal is to convert these ideas into actionable projects, such as grant proposals or collaborative efforts.

The moderators and organizers will review the collected ideas and organize them into key topics for group discussions scheduled for tomorrow. This process will involve multiple cycles of group work to generate viable projects.

By the end of the workshop, participants are expected to develop detailed plans and potential projects. However, given the scope of the topics, the workshop will primarily serve as a starting point, with continued work beyond the event.

Participants should use the current session to propose and refine ideas they are interested in. The workshop will provide a foundation for future collaboration, with the understanding that comprehensive solutions will evolve over time.

A report summarizing the workshop outcomes will be available, detailing the proposed topics and next steps. Participants are encouraged to bring forward any new ideas or questions they have.