General recommendations of the meeting:

Overall, our vision for 2020 is that the faculty of the future builds bridges with

- The market (both the job market and the pharmaceutical market)
- Pharmaceutical industry (our research should directly serve industry and our education should prepare students for it)
- The Egyptian patients: our research and education should be optimized to the health priorities of the Egyptian community

The entire conference reflects the future trends of faculty of pharmacy that move us into the next decade and prepare us for future promises and challenges in pharmacy research, education, and community service.

Those trends can be described by three “I”s:

Our research and education are moving to be:

- **Interdisciplinary**: (built on collaboration between all departments-going beyond the department “walls”): Note that all sessions this year were inclusive of more than one department and more than one field
- **Intergenerational**: we started by senior experts and moved across the middle and junior generation. We strongly believe that the exchange between experience & wisdom of the seniors and enthusiasm & originality of the juniors will strengthen our system
- **Innovative**: innovation is the key to any future advance and any international competitiveness
SESSION II: The Faculty of the Future

Coordinator: Dr Ramy Karam

Recommendations:
- STDF provides great and fair opportunities to Egyptian researchers. We strongly encourage our faculty members to apply for STDF funding and we recommend they focus on the health priorities of the Egyptian community, on translational research, and on patent filing.
- We strongly recommend having national/license exams to give more freedom for different universities, while insisting on the highest standards for pharmacy in Egypt.
- We strongly recommend continuously revising our curricula to match international standards, and to meet the current needs and changing psychology of the new generations of students. Finally, we recommend narrowing the gap between our curricula and the real world.
- We recommend doing more efforts to prepare our students for the market, putting in mind that they have to practice all aspects of pharmacy while they are at the faculty level, since only 10% of what is taught in the lecture hall is used but 70% of what matters comes from practice.
- It is equally important to update our classrooms and lecture halls with technologies (e.g., video streaming, clicker system, mobile learning, etc.)
- We recommend experimenting with “flipped classroom” to adapt with the large numbers of students: that is, giving the students the lecture a week ahead then discussing it in the classroom and labs.
- We recommend focusing on digital literacy, helping our students sort and evaluate online material, updating our library and training our librarians to help students adapt with the digital age & information revolution.

Quotes:
“Basic research is very important, and STDF funds it. But it is also important to emphasize on translational research” Prof. Dr. Amr Adly
“We need to see what the world is doing and adapt it to our needs in Egypt.” Prof. Dr. Adel Saqr
“We are yet to witness the golden age of pharmacy!” Prof. Dr. Suleiman Bahouth
SESSION III: New trends in drug discovery

Coordinator: Dr Aly Abdelbary

Overall, the three presentations of the session had a major common theme: the importance of implementing computers in our research. This includes all aspects of computational biology, genomics, systems biology, bioinformatics, and computer-aided drug design.

Some specific recommendations:

- We recommend focusing on the human-associated bacteria (the human microbiota) for the discovery of more suitable antimicrobial therapeutics, including probiotics.
- We recommend expanding the training of our students to computer-aided drug design since this is not highly expensive and can help our research and education beat the international competition.
- We recommend expanding education of genomics and systems biology, and teaching our junior researchers the basics of genome analysis and metabolic modeling for finding drug targets. These areas will encourage the collaboration between the departments of: Microbiology, Biochemistry, Pharmaceutical Chemistry, and Pharmacology.

Quotes:

“I have been enjoying doing science and discovering things about nature. But nothing is more motivating that when some of your science generates a product useful to others” Alex Mira
Session 4:
Personalized Medicine & the Future of Therapeutics
Coordinator: Dr Mohammed Nooh

1- New technologies have the potential to increase the use of genetic information in clinical decision-making, furthering prevention, surveillance, and safer, more effective drug therapies for patients.
2- Personalized medicine offers the promise of refining treatment decisions for those diagnosed with chronic and life-threatening illnesses.
3- Personalized medicine should become an essential part of clinical decision-making.
4- Policies and programs should be developed to inform and improve understanding and appropriate coordination and delivery of personalized medicine.
5- It is recommended to establish a National Advisory Panel that would review research and provide recommendations on tests, guidelines, service delivery and education to maximize the benefits of personalized medicine.

Session 5:
The Drug of the Future: From Factory to Patient
Coordinator: Dr Medhat Al-Ghobashy

1- Importance of integration between research and industry
2- The need for updating pharmacy curriculum to include pharmacoeconomics.
3- The need for a clear strategy for improving of Egyptian pharmaceutical industry.
4- Importance of stopping HCV infection in order to solve HCV problem in Egypt.
5- Importance of HCV screening all over Egypt in order to count undiagnosed HCV cases.
6- Role of nanotechnology in advancing pharmaceutical industry in Egypt.
7- The need for more applied research through calibration with industry.
Session 7: 
Next Generation Assays
Coordinator: Dr Mohamed Farag

Dr. Hassan talk highlights the potential of developing many new low-cost potentiometric, amperometric and optical sensors for the determination and evaluation of pharmaceutical compounds environmental pollutants and industrial products. The introduction of HPLC coupled to NMR as a novel tool along with other large scale metabolomics analysis for the quality control of nutraceuticals along with expediting drug discovery from natural resources is also a case well presented in the scientific talk of Prof. Bernd Schneider and Dr. Mohamed Ali Farag. Last the application of real-time analytics and chemometrics for monitoring critical quality attributes (CQA) of target analytes on a time scale of seconds to minutes is rapidly evolving as highlighted in Dr. Medhat El Ghabashi talk. Overall, certainly these new research areas presented by all speakers need to be considered in our research evolving about analysis of pharmaceuticals, securing large funding is more needed to purchase state of the art instrumentation as LC-NMR and high resolution LC-MS, needed for the technologies are lacking in all Egyptian academic and research institutes.

Session 8: 
Community and Industry Stakeholders
Coordinator: Dr Mina Ebrahim
Ensuring pharmacist continuous education and updating is essential for reducing errors encountered in community pharmacy. Strategic planning of pharmacy enhances customer satisfaction and increases customer retention.

If the continuous process improvement is a journey, the operational excellence will be the price at the end of this journey. Operational excellence is a goal of conducting business in a manner that improves quality obtained higher yields faster throughput and lower wastes.
Conclusions:

Research and education should be moving to be:

**Interdisciplinary:** Expand education and research on collaborative fields including computational biology, genomics, systems biology, bioinformatics, chemometrics, nanotechnology, and computer-aided drug design

**Integrational:** Integrate education and research with industry needs, pharmacy practice and Egypt's health challenges

**Innovative:** Introduce innovative topics and techniques in teaching and learning such as nanotechnology, computer-aided drug design, personalized medicine, pharmacoeconomics using “flipped classroom”, mobile learning, video streaming and digital literacy.

Establishing a national pharmacy exam board to overview the process of licensing of pharmacy graduates to ensure the highest standards of practicing pharmacists in Egypt

Ensuring pharmacist continuous education and updating is essential for reducing errors encountered in community pharmacy

Seeking national and international funding and training will augment our local resources and enhance our scientific impact

Personalized medicine should become an essential part of clinical decision-making. Establishing a national advisory panel to review research and provide guidelines to maximize the benefits of personalized medicine.