

# KEDI-ADB Capacity Building for Educational Professionals in Uzbekistan

Topic 3: Good practices of the STEM partnership

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## 'Me' & Key Outcomes in Korean STEAM/STEM Education

- Since conducing the policy study for 'Developing Action Plans for STEAM Education in Korea' in 2011, I have been carrying out several STEAM education projects for Korean government agencies.
  - Developing Materials of STEAM Education for Robot and AI(2014-2019)
  - A Project for Korean STEAM Education Status(2014)
  - The Effect of 2015 Korea STEAM Education(2015-2016)
  - An Investigation of K-12 STEAM Education in Korea(2020)
- Key Outcomes of STEAM education in Korea over the past 10 years are as follows:
  - Pedagogical innovative changes (i.e. instruction improvements and diversity of teaching methods)
  - Professional development of teachers on STEAM
  - Increased teachers' networks and collaboration
  - Active partnerships with out-of-school institutions, industries, and universities for expansion of educational resources and experiences.

# Framework for Implementing STEAM Education Initiative at the National Level



Source: Different approaches to learning science, technology, engineering, and mathematics-Case studies from Thailand, The Republic of Korea, Singapore, and Finland(2021)

Original Source: Government of the Republic of Korea, Ministry of Education. 2018. Guidebook for Science Teachers for Grade 3 and 4. Sejong.

# Korean STEAM Supporting Program(KOFAC)



# Partnership of Promotion of STEM Education



# Why Do We Need Partnership specially in STEM Education?

- STEAM education is multidisciplinary.
- Because of the rapid development of STEM field, the educational resources of schools are hard to keep up with the change.
- Just-in-time education is difficult.
- Needs of the current generation of students are diverse and specific.
- In general, teachers are limited to one or two majors, and supposed to teach the content of the subject they majored in.
- The partnership between schools, institutions, and industries and company helps and solve difficulties such as limitations in material resources, human resources, space, and time in education.
- In STEAM education, teachers must collaborate with other teachers, and with experts from various institutions.

# Cases and Types of Partnership for Education

• School and University



Office of Ulsan Education, https://blog.naver.com/us\_edu/221581194715

• Office of Education in Region District and University



Office of Kyunggido Education, https://blog.daum.net/ken\_news/6049163

STEAM Teaching and Learning Materials by EBS (Korea Educational Broadcasting System)





STEAM Teaching and Learning Materials by KIRO, Korea Institute of Robotics & Technology Convergence





### STEAM Teaching and Learning Materials by Scientists and Engineering Without Borders





Education Program by POSCO, POhang Iron & Steel COmpany Science, Beyond Imagination, Smart Factory



https://newsroom.posco.com/kr

## KOREA STEAM education Status that I am aware of...

- At the beginning of the STEAM education, the central government, such as KOFAC, has played a key role in driving STEAM education. STEAM initiatives have been implemented based on government strategic plans which involve setting STEAM education policy, supporting government funding, developing the curriculum, etc.
- This top-down and government-led approach is effective and efficient to get visible results within a short time, but this approach has some fundamental limitations to make a sustainable climate for STEAM education in every school.
- However, as the STEAM education progressed, students, teachers, parents, and society began to talk about the effects and outcomes of STEAM education.
- Some organizations participating in the partnership also began to emphasize on the importance and necessity of STEAM education.
- STEAM education is leading a change in education along with a change in the perception of people and society.

# Korea Foundation for the Advancement of Science & Creativity

https://steam.kofac.re.kr/



미래직업 연계형

# Examples of teachers' collaboration: SNS

#### 1428 teachers, Kakao-talk, nationwide



#### share information

- construct STEAM materials
- solve problems
- develop professionalism in teaching
- human relationship

#### band



## Examples of teachers' collaboration: Google Classroom, online-manual

Online Teaching Materials by Park, et.(2020)



#### art center **n a b i**

about us	program	education	lab	news/notice	nabi archive 2020

# WHAT IS A GOOD SOCIETY?

nabi lecture series

2<sup>nd</sup> series. War

art center nabi

Q KOR -

Art Center, NABI



[만인예술가] 권력재생산 2012



[만인예술가] 강남부자를 이겨라







[만인예술가] 소솔집 2012



#### http://www.nabi.or.kr/



1차시 듣는 미술 보는 소리

### STEAM Teaching & Learning Materials by Art Center, NABI

2019 STEAM 프로그램 - 학문분야 주제별 융합형



- 소리의 발생 원리와 특성에 대해 말할 수 있다.

- 사운드아트 작품을 듣고 청각, 시각의 공감각을 경험한다.

# A.I. 도레미

인공지능 × 사운드아트



#### 2차시 만지고 두드리는 전자악기







- 다양한 전자악기! 3차시 함께 연주하는 인공지능 전자악기



- 인공지능 오픈소스를 이용하고 인공지능 전자악기를 경험할 수 있다.

- 사람과 인공지능이 협업하는 미래 모습에 대해 상상할 수 있다.



<2021 창의인재 동반사업 > CREATIVE + 창의교육생 모집 2021.05.03 - 2021.05.14



2020 드림아트랩 4.0 <닥터 퓨처 스튜디오> 2020.04.01 - 2020.11.30



<2020 창의인재 동반사업 > CREATIVE + 창의교육생 모집 2020.04.14 - 2020.04.21

# STEAM Education Program, STEAM Teachers' Training Program by Art Center, NABI



2019 융합인재교육(STEAM) 프로그램 연구개발 2019.06.28 - 2019.12.31



<2019 창의인재 동반사업 X 아트센터 나비> 창의교육생 모집 2019.04.17 - 2019.04.26



블록체인과 커뮤니티, 더 나온 사회와 인간적인 도시 2018.12.03 - 2018.12.03 Partnership between School and Industry

Yongin Information High School & Intel co. Intel Innovation Lab, as part of Intel Make Tomorrow





https://www.wowtv.co.kr/NewsCenter/News/Read?articleId=A201811200265



https://www.facebook.com/yiihskr/

# '뉴칼라' 인재양성 위한 국내 최초 P-TECH 학교 설립!

IBM 브랜드

IBM KOREA - 2018. 9. 17. 11:29



#### Korea IBM &

Seoul Seo-myung Computer High School

URL 복사

- Open New School for P-TECH
- A.I., Programming, big data analysis, machine learning, etc.

<IBM P-TECH MOU 체결식>



## What have we learned from the partnership?

What are the success factors?

- zest for future education
- challenge to adapt to change
- good program
- social responsibility

What are the greatest challenges?

- prepare for a New world
- together as a companion
- reduce anxiety for new challenges

What is strategy for sustainability?



# Thank you

