
PAO

1
00:00:05,190 --> 00:00:03,830
hi welcome to the international space

2
00:00:07,749 --> 00:00:05,200
station flight control room where we

3
00:00:10,070 --> 00:00:07,759
have joining us joining us here today uh

4
00:00:12,230 --> 00:00:10,080
camille elaine who is the assistant

5
00:00:13,509 --> 00:00:12,240
program scientist for the space station

6
00:00:15,350 --> 00:00:13,519
and she's going to tell us a little bit

7
00:00:17,430 --> 00:00:15,360
today about some of the science

8
00:00:19,590 --> 00:00:17,440
experiments that are specifically aimed

9
00:00:21,429 --> 00:00:19,600
at getting students involved in science

10
00:00:22,630 --> 00:00:21,439
and stem activities

11
00:00:23,910 --> 00:00:22,640
thank you so much for joining us thank

12
00:00:25,589 --> 00:00:23,920
you for having me

13
00:00:27,269 --> 00:00:25,599

all right so i think one of the ones

14
00:00:29,429 --> 00:00:27,279
that we hear a lot about is the sally

15
00:00:30,470 --> 00:00:29,439
sally ride earth cam and i know that

16
00:00:32,389 --> 00:00:30,480
that's been

17
00:00:34,709 --> 00:00:32,399
back in operation lately and maybe you

18
00:00:37,030 --> 00:00:34,719
have some updated results on that for us

19
00:00:38,069 --> 00:00:37,040
yes so what's new about sally ride

20
00:00:40,549 --> 00:00:38,079
earthkam

21
00:00:42,389 --> 00:00:40,559
since last month when the last mission

22
00:00:44,790 --> 00:00:42,399
was held is the record number of

23
00:00:46,950 --> 00:00:44,800
students that we've been able to reach

24
00:00:50,029 --> 00:00:46,960
with that mission during the summer we

25
00:00:54,709 --> 00:00:50,039
were able to reach 34 000 students

26
00:00:56,470 --> 00:00:54,719
562 schools in 34 countries across six

27
00:00:58,709 --> 00:00:56,480
continents and so those are

28
00:01:00,790 --> 00:00:58,719
record-breaking numbers for us that's

29
00:01:03,590 --> 00:01:00,800
very impressive very impressive earth

30
00:01:05,830 --> 00:01:03,600
cam stands for earth knowledge acquired

31
00:01:08,149 --> 00:01:05,840
by middle school students and it was an

32
00:01:10,230 --> 00:01:08,159
educational project developed by dr

33
00:01:13,109 --> 00:01:10,240
sally ride and her company sally ride

34
00:01:15,590 --> 00:01:13,119
science really back in expedition 2. so

35
00:01:17,429 --> 00:01:15,600
it's one of the longest running

36
00:01:19,990 --> 00:01:17,439
investigations we've had on board the

37
00:01:22,950 --> 00:01:20,000
space station and it is targeted at

38
00:01:25,030 --> 00:01:22,960

middle school students and engaging them

39
00:01:28,310 --> 00:01:25,040
in their studies of science if they're

40
00:01:29,990 --> 00:01:28,320
doing geography or geology for example

41
00:01:32,469 --> 00:01:30,000
or math

42
00:01:35,590 --> 00:01:32,479
they do the trajectories they calculate

43
00:01:38,149 --> 00:01:35,600
the trajectories of the space station

44
00:01:40,069 --> 00:01:38,159
so what they do is that they select

45
00:01:41,749 --> 00:01:40,079
different targets around the earth that

46
00:01:44,149 --> 00:01:41,759
they are interested in different

47
00:01:47,350 --> 00:01:44,159
geological features of our earth and

48
00:01:49,030 --> 00:01:47,360
they send those targets up to the camera

49
00:01:51,190 --> 00:01:49,040
that's programmed on board the space

50
00:01:53,350 --> 00:01:51,200
station and then as the space station is

51
00:01:55,030 --> 00:01:53,360
flying over those targets it takes the

52
00:01:57,429 --> 00:01:55,040
images and those images are then

53
00:02:00,069 --> 00:01:57,439
downloaded and the students have access

54
00:02:04,310 --> 00:02:00,079
to them so they are actually getting the

55
00:02:06,709 --> 00:02:04,320
real life um features of these different

56
00:02:08,710 --> 00:02:06,719
sites versus what may be in the textbook

57
00:02:10,229 --> 00:02:08,720
develop two or three years ago that's

58
00:02:11,990 --> 00:02:10,239
got to be exciting

59
00:02:14,710 --> 00:02:12,000
to take a picture from spacex very

60
00:02:16,869 --> 00:02:14,720
exciting the other aspect of this

61
00:02:19,110 --> 00:02:16,879
project which is very very interesting

62
00:02:21,350 --> 00:02:19,120
is the fact that the students who

63
00:02:23,750 --> 00:02:21,360

actually manage the program they run the

64
00:02:26,790 --> 00:02:23,760
missions uh undergrad students at the

65
00:02:28,949 --> 00:02:26,800
university of california san diego they

66
00:02:31,270 --> 00:02:28,959
are the ones who upload the targets they

67
00:02:33,509 --> 00:02:31,280
are the ones who download the images and

68
00:02:36,150 --> 00:02:33,519
put it on the web accessible to all

69
00:02:38,229 --> 00:02:36,160
students so we are experiment

70
00:02:40,309 --> 00:02:38,239
exactly and so we feel like we are

71
00:02:43,110 --> 00:02:40,319
growing the next generation of mission

72
00:02:45,910 --> 00:02:43,120
operators and flight controllers based

73
00:02:48,309 --> 00:02:45,920
on this uh the opportunities they have

74
00:02:50,390 --> 00:02:48,319
to manage this program that's that's

75
00:02:52,309 --> 00:02:50,400
really amazing i'm sure that's a

76
00:02:54,070 --> 00:02:52,319
exciting program for the students yes

77
00:02:56,150 --> 00:02:54,080
and then i know that sometimes they also

78
00:02:57,589 --> 00:02:56,160
get to actually talk with astronauts via

79
00:02:59,430 --> 00:02:57,599
ham radio can you tell us a little bit

80
00:03:01,830 --> 00:02:59,440
about that yes that's called the ham

81
00:03:04,149 --> 00:03:01,840
radio on iss

82
00:03:06,869 --> 00:03:04,159
and students it's another global program

83
00:03:10,149 --> 00:03:06,879
like earthkam students from all over the

84
00:03:14,070 --> 00:03:10,159
world get access real time to the

85
00:03:15,830 --> 00:03:14,080
astronauts if the iss is flying directly

86
00:03:18,309 --> 00:03:15,840
over where their

87
00:03:20,550 --> 00:03:18,319
school is or where the event is taking

88
00:03:22,550 --> 00:03:20,560

place called a direct contact they have

89
00:03:24,149 --> 00:03:22,560
about 10 minutes to talk to the

90
00:03:29,350 --> 00:03:24,159
astronauts

91
00:03:31,910 --> 00:03:29,360
period and school is in session there's

92
00:03:33,830 --> 00:03:31,920
a way to tell a bridge that connection

93
00:03:36,070 --> 00:03:33,840
through some ground stations that are

94
00:03:37,190 --> 00:03:36,080
located around

95
00:03:39,750 --> 00:03:37,200
our earth

96
00:03:42,630 --> 00:03:39,760
and the students still get to access the

97
00:03:45,110 --> 00:03:42,640
astronauts and it is an amazing amazing

98
00:03:47,110 --> 00:03:45,120
inspiring experience because they

99
00:03:49,509 --> 00:03:47,120
instantly realize that they're talking

100
00:03:51,830 --> 00:03:49,519
to another human being that is off of

101
00:03:54,710 --> 00:03:51,840
the earth you know in a real time

102
00:03:56,470 --> 00:03:54,720
situation so it's a very inspiring very

103
00:03:57,910 --> 00:03:56,480
engaging activity

104
00:04:00,070 --> 00:03:57,920
have you gotten to listen in on any of

105
00:04:02,550 --> 00:04:00,080
those conversations i have actually have

106
00:04:04,630 --> 00:04:02,560
i've been a part of two one in my birth

107
00:04:07,110 --> 00:04:04,640
country of trinidad and tobago where

108
00:04:09,990 --> 00:04:07,120
there was an an auditorium filled with

109
00:04:12,789 --> 00:04:10,000
400 students from all over the caribbean

110
00:04:14,710 --> 00:04:12,799
who hadn't ever had never ever dreamt

111
00:04:17,830 --> 00:04:14,720
about space didn't know anything about

112
00:04:21,189 --> 00:04:17,840
space and they got to learn about space

113
00:04:24,230 --> 00:04:21,199

communications how we communicate to the

114
00:04:26,469 --> 00:04:24,240
iss but also in the anticipation of

115
00:04:28,870 --> 00:04:26,479
getting to speak to the astronauts you

116
00:04:31,830 --> 00:04:28,880
can tell you know just the excitement

117
00:04:34,629 --> 00:04:31,840
and and the engagement and and how it

118
00:04:36,870 --> 00:04:34,639
really inspired them to go off and do

119
00:04:39,110 --> 00:04:36,880
their studies in in a more

120
00:04:41,909 --> 00:04:39,120
effective and and better way you know i

121
00:04:44,070 --> 00:04:41,919
hope it does um well i guess nasa isn't

122
00:04:46,150 --> 00:04:44,080
the only one who has um some of the

123
00:04:47,590 --> 00:04:46,160
educational science experiments european

124
00:04:49,110 --> 00:04:47,600
space agency also has some that they're

125
00:04:50,469 --> 00:04:49,120
working specifically with alexander

126
00:04:52,230 --> 00:04:50,479
gerst this time around that's right

127
00:04:53,430 --> 00:04:52,240
that's correct the flying classroom is

128
00:04:55,909 --> 00:04:53,440
what it's called can you tell us about

129
00:04:58,390 --> 00:04:55,919
that yes it's an educational payload

130
00:05:00,870 --> 00:04:58,400
demonstration that we do across the

131
00:05:04,070 --> 00:05:00,880
partnerships and what he's specifically

132
00:05:07,189 --> 00:05:04,080
focused on is demonstrating fundamental

133
00:05:09,830 --> 00:05:07,199
physics properties in space and so for

134
00:05:12,150 --> 00:05:09,840
example he's going to access just

135
00:05:14,230 --> 00:05:12,160
everyday items that's on board the space

136
00:05:17,510 --> 00:05:14,240
station for example he's going to

137
00:05:19,670 --> 00:05:17,520
demonstrate the movement of a gyroscope

138
00:05:21,510 --> 00:05:19,680

using two cds and a rod that will

139
00:05:23,510 --> 00:05:21,520
connect them and looking at the

140
00:05:24,629 --> 00:05:23,520
stability of the gyroscope's angular

141
00:05:27,350 --> 00:05:24,639
momentum

142
00:05:29,830 --> 00:05:27,360
relative to the trajectory of the iss as

143
00:05:33,110 --> 00:05:29,840
as it orbits the earth another one he's

144
00:05:35,830 --> 00:05:33,120
going to look at is how pure water forms

145
00:05:38,629 --> 00:05:35,840
in space versus how it would form on

146
00:05:41,749 --> 00:05:38,639
earth and the principle states that

147
00:05:45,909 --> 00:05:41,759
forming decays at a much slower rate in

148
00:05:48,629 --> 00:05:45,919
space than it is on earth so by him um

149
00:05:51,590 --> 00:05:48,639
mixing air and water together in a

150
00:05:52,950 --> 00:05:51,600
syringe shaking it vigorously and

151
00:05:55,670 --> 00:05:52,960
forming those

152
00:05:57,670 --> 00:05:55,680
forms he would look over time at how it

153
00:05:59,510 --> 00:05:57,680
decays and compares it to what's

154
00:06:02,390 --> 00:05:59,520
happening on earth so it's an

155
00:06:04,070 --> 00:06:02,400
observation that that the students are

156
00:06:05,749 --> 00:06:04,080
going to see

157
00:06:08,710 --> 00:06:05,759
how different principles are

158
00:06:10,710 --> 00:06:08,720
demonstrated on in in microgravity

159
00:06:12,629 --> 00:06:10,720
environment those are probably pretty

160
00:06:14,469 --> 00:06:12,639
difficult um things to explain here on

161
00:06:17,510 --> 00:06:14,479
the ground so that's a big help for

162
00:06:19,510 --> 00:06:17,520
teachers exactly exactly um and so the

163
00:06:22,550 --> 00:06:19,520

the video is just provided to teachers

164
00:06:24,550 --> 00:06:22,560
or yes it's available to teachers on the

165
00:06:25,749 --> 00:06:24,560
website in this particular case it's an

166
00:06:28,150 --> 00:06:25,759
esa

167
00:06:30,790 --> 00:06:28,160
demonstration so it will be available on

168
00:06:33,430 --> 00:06:30,800
their website nasa does

169
00:06:36,309 --> 00:06:33,440
our astronauts do epo demos that are

170
00:06:38,629 --> 00:06:36,319
available on on the nasa website okay

171
00:06:40,309 --> 00:06:38,639
well i know um the cygnus is getting

172
00:06:42,150 --> 00:06:40,319
ready to leave now but when it arrived

173
00:06:44,390 --> 00:06:42,160
it brought with it a few of uh

174
00:06:45,830 --> 00:06:44,400
educational experiments can you go

175
00:06:47,510 --> 00:06:45,840
through some of those yes those are

176
00:06:50,469 --> 00:06:47,520
called the space flight student

177
00:06:53,110 --> 00:06:50,479
experiment program run by the national

178
00:06:55,830 --> 00:06:53,120
center for space science education in

179
00:06:59,029 --> 00:06:55,840
partnership with nanorex

180
00:07:01,749 --> 00:06:59,039
corporation which is a commercial entity

181
00:07:04,870 --> 00:07:01,759
and they give students access to sending

182
00:07:07,430 --> 00:07:04,880
their designed experiments to space so

183
00:07:11,029 --> 00:07:07,440
two were very interesting to me

184
00:07:14,070 --> 00:07:11,039
one was looking at the crystallization

185
00:07:16,790 --> 00:07:14,080
and coagulation of proteins and that's

186
00:07:19,110 --> 00:07:16,800
really important to us because one of

187
00:07:21,749 --> 00:07:19,120
our very high valued

188
00:07:24,070 --> 00:07:21,759

biological research that we do on space

189
00:07:26,309 --> 00:07:24,080
station is the growing of protein

190
00:07:29,270 --> 00:07:26,319
crystals so thinking that high school

191
00:07:31,909 --> 00:07:29,280
students could actually design a similar

192
00:07:34,469 --> 00:07:31,919
experiment looking at how proteins grow

193
00:07:38,070 --> 00:07:34,479
and we know when proteins grow in space

194
00:07:39,990 --> 00:07:38,080
they grow at a much bigger size and much

195
00:07:42,230 --> 00:07:40,000
clearer than they would on earth and

196
00:07:44,869 --> 00:07:42,240
that gives insight into the structure of

197
00:07:47,070 --> 00:07:44,879
a protein which is very beneficial to

198
00:07:49,990 --> 00:07:47,080
designing different drugs and

199
00:07:52,309 --> 00:07:50,000
therapeutics for diseases and so to have

200
00:07:55,589 --> 00:07:52,319
high school students being able to

201
00:07:57,510 --> 00:07:55,599
develop a similar experiment looking at

202
00:08:00,150 --> 00:07:57,520
how this protein is this particular

203
00:08:02,309 --> 00:08:00,160
protein is crystallized in space is very

204
00:08:04,070 --> 00:08:02,319
very interesting if you think about that

205
00:08:06,150 --> 00:08:04,080
absolutely what's what's the crew's

206
00:08:07,670 --> 00:08:06,160
involvement in that do they need to work

207
00:08:09,909 --> 00:08:07,680
with the experiment themselves or is it

208
00:08:11,830 --> 00:08:09,919
pretty self-contained they are expected

209
00:08:14,070 --> 00:08:11,840
to activate and deactivate the

210
00:08:16,550 --> 00:08:14,080
experiment but while the experiment is

211
00:08:18,309 --> 00:08:16,560
going on they don't have any um access

212
00:08:20,150 --> 00:08:18,319
okay all right well that's

213
00:08:23,189 --> 00:08:20,160

easy to get that done with with the

214
00:08:25,749 --> 00:08:23,199
minimum use of crew time exactly exactly

215
00:08:28,230 --> 00:08:25,759
um and then i know um also the the

216
00:08:29,990 --> 00:08:28,240
station program works to connect science

217
00:08:31,430 --> 00:08:30,000
with students

218
00:08:32,709 --> 00:08:31,440
on earth can you tell me a little bit

219
00:08:35,670 --> 00:08:32,719
about some of the ways other ways that

220
00:08:37,750 --> 00:08:35,680
we do that so you know um brandi the

221
00:08:40,469 --> 00:08:37,760
space station we did not build the space

222
00:08:43,430 --> 00:08:40,479
station to do education

223
00:08:45,350 --> 00:08:43,440
activities and projects but the presence

224
00:08:47,509 --> 00:08:45,360
of the space station and the presence of

225
00:08:48,550 --> 00:08:47,519
the crew members on board the space

226
00:08:50,310 --> 00:08:48,560
station

227
00:08:53,269 --> 00:08:50,320
really acts as

228
00:08:55,910 --> 00:08:53,279
an inspiration and a way of engaging

229
00:08:58,470 --> 00:08:55,920
students in their studies of science

230
00:09:01,030 --> 00:08:58,480
technology engineering and math and so

231
00:09:02,790 --> 00:09:01,040
it is a way for us to give access to

232
00:09:05,430 --> 00:09:02,800
students

233
00:09:07,670 --> 00:09:05,440
give them access to doing experiments on

234
00:09:10,150 --> 00:09:07,680
board the space station and really

235
00:09:12,870 --> 00:09:10,160
growing the next generation of stem

236
00:09:15,509 --> 00:09:12,880
workforce not just for the us but for

237
00:09:17,430 --> 00:09:15,519
for all across the world

238
00:09:18,790 --> 00:09:17,440

this is um i don't know if you would

239
00:09:20,630 --> 00:09:18,800
have any examples but i know we have a

240
00:09:23,750 --> 00:09:20,640
lot of students who have come

241
00:09:25,269 --> 00:09:23,760
through here as interns and and co-ops

242
00:09:27,030 --> 00:09:25,279
and things like that do you are you

243
00:09:29,110 --> 00:09:27,040
seeing any of them come from programs

244
00:09:31,030 --> 00:09:29,120
that have done anything like that do you

245
00:09:32,470 --> 00:09:31,040
write that at all i started talking

246
00:09:33,430 --> 00:09:32,480
about that in the beginning with

247
00:09:35,670 --> 00:09:33,440
earthcam

248
00:09:38,790 --> 00:09:35,680
right with the the graduate students at

249
00:09:41,269 --> 00:09:38,800
ucsd who were trained to be mission

250
00:09:43,750 --> 00:09:41,279
operators for this particular earth camp

251
00:09:46,710 --> 00:09:43,760
we have a few who are actually working

252
00:09:50,070 --> 00:09:46,720
here as flight controllers in mission

253
00:09:52,230 --> 00:09:50,080
control so that is a concrete example

254
00:09:54,070 --> 00:09:52,240
already reaping the benefits exactly

255
00:09:55,509 --> 00:09:54,080
exactly well thanks so much this is

256
00:09:56,870 --> 00:09:55,519
fascinating i'm sure a lot of people

257
00:09:58,870 --> 00:09:56,880
will want to get their own students

258
00:10:00,870 --> 00:09:58,880
involved so you can go to nasa.gov and

259
00:10:02,550 --> 00:10:00,880
find out more about all of these um

260
00:10:05,110 --> 00:10:02,560
thanks again this was camille elaine

261
00:10:06,710 --> 00:10:05,120
joining us at the assistant program