How NASA trained Neil Armstrong and his crewmates to land on the lunar surface

We choose to go to the Moon in this decade and do the other things, not because they are easy, but because they are hard,” the 35th president of the United States John F. Kennedy said resolutely to a large crowd that had gathered around his podium at Rice University Stadium in Houston, Texas, on 12 September 1962. That day the
politician had laid down a gauntlet to NASA. The space agency’s job was to find astronauts with the right stuff. Fortunately for NASA, the US wasn’t short of citizens wanting to step up to the challenge.

One of the first candidates came in the form of a tall former pilot of the US Navy. An individual who had seen action in the Korean War – flying 78 missions for a total of 121 hours – and later became an experimental research test pilot. He went by the name of Neil Armstrong.

To NASA, Armstrong was the perfect fit; the space agency had decided that some experience of flying jets was indeed much more valuable than any kind of scientific training. There were also time constraints, meaning that the team who would later land on the Moon in July 1969 would need to come well-equipped with experience. Naturally NASA looked to the Navy and Air Force to make their selections, but it turned out that Armstrong – who was chosen as a candidate in 1962 – became the only successful civilian candidate. His future crewmates Edwin ‘Buzz’ Aldrin and Michael Collins would be selected the following year, fresh from the Air Force and racing to go, their flight capability backed up with degrees in aeronautical engineering and science.

Crew assignment for the future lunar missions was announced on 20 November 1967 – a year before Apollo 8 would orbit the Moon and return safely. The aim of Apollo 8, Apollo 9 and Apollo 10 was to swing into lunar orbit and test every aspect of hardware that would make a future landing possible. When it came to training, the tasks laid out before Armstrong, Aldrin and Collins were no different: every day, hour, minute and second was a dress rehearsal in how to make that “one small step for [a] man, one giant leap for mankind” a reality.

There was a lot to do, and the aim of reaching the Moon before the Soviets added a lot of pressure. NASA had only completed its first spacewalk two years before crew assignment, when Ed White left the confines of Gemini 4 for a 23 minute float above the atmosphere. While the Gemini project paved the way for Apollo, reaching and then landing on the Moon was still a big step up.

The Apollo astronauts worked tirelessly for 16 hours on a daily basis. No stone was left unturned in simulating the spacecraft, conditions or environment the spacefarers would face – what’s more there were fewer computers and technologies than those easily available at our fingertips today.

If you took a walk through the testing facilities at NASA back in the 1960s, they’d look quite primitive. If the space agency wanted to reduce gravity to the one-sixth you’d discover on the Moon, for example, it simply suspended its candidates on a steeply inclined wall, making them run, jump and walk along it. It’s a far cry from today’s jetliners that swoop in arcs, giving passengers the low-gravity experience for minutes at a time.

Despite the obvious restraints, the facilities looked the part. An Apollo lander, fashioned out of aluminium and with over 1,800 kilograms (4,000 pounds) of thrust generated by an electric engine, was born out of a collaboration between NASA and Bell Aerosystems. Surrounding it, fake Moon rocks littered the surface to accurately depict the landing site. Everything was accounted for, from Armstrong’s attempts at piloting in preparation for the nail-biting, bumpy descent to the cratered, mountainous terrain to the planting of the US flag. Armstrong, given that he would be the commander of Apollo 11, had to practise his first step onto an ‘alien surface’ and climb back onto the lunar lander to mock up the return home. “I really don’t have the foggiest idea of what I was doing,” a puzzled Armstrong was quoted as saying after the simulation. “If I were simulating a mission phase, I would have the helmet on and suit pressurised.”

The primary aim of Apollo 11 was to not only observe the Moon, but to collect samples of it for further analysis. For this part of the program, both Armstrong and Aldrin were led out to the Arizona desert. It’s here that NASA and scientists from the United States Geological Survey, or USGS for short, had been blasting large craters into the dry surface. A perfect representation of the lunar terrain, as the pair of astronauts discovered on their tour ... the arid location, the USGS taught them about geological features as they explored. On what seemed to be the perfect site, simulations and soil-sampling techniques were practised, with the astronauts donning replica
spacesuits to create an authentic experience. Future Apollo astronauts, namely James Irwin and David Scott of Apollo 15, returned here later to test out the first lunar rover. Getting to the lunar surface was just as important as the return home. It was intended that the astronauts would make a splashdown in the ocean. But what if the capsule missed its mark? According to NASA, there was every chance that the trio could have crash-landed thousands of miles off course, smashing through the leafy, warm and wet greenery of a jungle or smacking and sinking into the sands of a sweltering, hot desert. Wherever they ended up, they had to be prepared to survive the environmental extremes. To prepare for such an occasion the astronauts were carted off to jungle survival school, located at Albrook Air Force Base in Panama, where they were tasked with anything from chopping down trees and foraging for food to making the most of leaves and branches to create lean-tos and tackling the challenging river rapids of the Panama Canal Zone. If the astronauts were extremely unlucky, they’d land in the desert. Stead Air Force Base in Nevada suited their needs perfectly for tackling these complexities, being ideal for desert survival training. Apollo astronauts, even beyond the days of Apollo 11, were experts at creating makeshift shelters to weather sandstorms and steering clear of any desert wildlife perceived to be dangerous. The relentless training Armstrong, Aldrin and Collins had endured might have been gruelling, but it helped them to make history on 20 July 1969. From the lunar surface, Aldrin stopped carrying out his experiments and answered a call. It was President Nixon, congratulating him and Armstrong on a successful landing. “All of us look forward to seeing you on the USS Hornet on Thursday,” Nixon closed. Aldrin replied, “I look forward to that very much, sir.”