

Overview and Discussion

Group 3

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;The three most important factors when buying laptops for middle schoolers use are ...

- 1) Memory - For the use cases listed, simulations and office productivity applications can tend to be RAM hogs. Therefore, having well-performing memory(DDR4-DDR5) and having a formidable capacity(bare minimum 4Gb) is one of the most important factors. Also, the majority of students need to multitask while completing assignments, having low RAM will have adverse effects on the performance of the PC. Having a lagging PC could also delay the sending of Emails or other student messaging platforms. Since students like to procrastinate, having emails delayed by a few minutes could result in the assignment being submitted late.
- 2) Processor Speed/Chipset - Processor speed is second to memory but arguably as important, the two working synchronously provide the user with a well-performing PC. For tasks like media editing, rendering videos and images produce heavy strain on the CPU. The laptop required needs to have a run-of-the-mill performance CPU, as most CPUs produced nowadays are enough to handle most functions. If the PC lacked a dedicated GPU then CPU quality would have to be higher to handle tasks, as it would be more of a stress point for the system overall.
- 3) Storage Amount/Format - Media files can be quite large, and the majority of the students wouldn't delete files right after submission, because they may have use for them later(Studying, Teachers accidentally deleting files requiring resubmission). Therefore having ample storage size allows the students the comfortability of not worrying about their storage filling up. Also, the type of storage factors into the read and write times, which are important for productivity applications and file submissions. Since SSD costs are dropping year after year, it would be important for the laptop chosen to have a good amount of storage($\geq 128\text{Gb}$) and preferably in an SSD format.

The least important factors when buying laptops for middle schoolers use are ...

- Display size - display size tends to be a factor for middle school students that is not seen as important because most laptops have an adequate screen size capable of performing all the required tasks needed for what the school requires.
- Port amount/typing - Although having higher specification USB ports(≥ 3.0) are important for file transfer and peripheral performance. The number of ports on the laptop wouldn't be as much of a stress point. The majority of laptops nowadays have enough ports to handle most tasks. Also, external USB hubs can be added to increase the number of ports. Therefore

Manufacturers investigated:

1. **Dell**
2. **Apple**
3. **Shenzhen Yule Technology Co., Ltd.**

Manufacturers ruled out:

4. Asus
5. Lenovo

Besides the three listed, our team also investigated Asus and Lenovo as manufacturers. The two PCs we came up with were Chromebook variants, and they both had quite low specs for the cost of the PCs overall. Both had 4Gb of Ram and didn't have close to the amount of storage needed for the tasks (32Gb emmc).

Make	Model	Processor Type	Processor Speed
Apple	Macbook Air	Apple M1 chip with 8-core CPU	3.2GHz
Dell	XPS 13	11th Generation Intel® Core™ i7-1165G7 Processor	12MB Cache, up to 4.7 GHz
Shenzhen Yule Technology Co., Ltd.	15.6 gaming laptop computer 16GB DDR4 RAM 512GB SSD + 1TB Intel I7 / I5 8th Generation quad core CPU metal notebook PC	Intel i7 6500U Dual-core	2.5Ghz up to 3.1GHz

Memory	Storage Type	Storage Amount	Networking Details
16GB	SSD	512GB	802.11ax Wi-Fi 6 wireless networking
16 GB, LPDDR4x, 4267 MHz, integrated, dual channel	SSD	512GB CL35 M.2	Killer™ Wi-Fi 6 AX1650 (2 x 2) and Bluetooth 5.1
8GB (Support Extend to 16GB)	HDD or SSD	1TB HDD (Support Extend 2TB HDD or Extend 128/256/512GB SSD)	Wireless: 802.11b/g/n ,Bluetooth: Bluetooth V4.0

Graphics Details	Display Details	Ports	Warranty Details
7-core GPU	13.3-inch (diagonal) LED-backlit display with IPS technology	Two Thunderbolt / USB 4 ports	AppleCare plus care for mac. An extra \$250 for accidental damage for up to 3 years. \$99 for screen repair \$300 for additional repair.
Intel® Iris Xe Graphics	13.3" FHD (1920 x 1080) InfinityEdge Non-Touch display	2 Thunderbolt™ 4 ports with Power Delivery/DisplayPort 1 USB 3.2 Gen 2 Type-C™ port with Power Delivery/DisplayPort 1 Headset (headphone and microphone combo) port	Premium Support – Extend your hardware warranty & get a personalized 24x7 support team
Intel HD Graphics 620+ NVIDIA GeForce GT940MX 2GB	15.6 inch IPS screen, resolution 1920*1080 16:9	1*Type-C (USB-C) 2*USB 3.0 2*USB 2.0 1*Headphone out & Mic-in 1*HDMI 1.4 1*SD card port 1* DC-IN jack	None :), Just buy more

Additional Notes	Price	URL
Comes with Apple AirPods	\$1,259 + \$228.99 insurance = \$1487.99	https://www.apple.com/us-hed/shop/buy-mac/macbook-air/space-gray-apple-m1-chip-with-8-core-cpu-and-7-core-gpu-256gb#
Comes with 1 year microsoft 365 and 1 year McAfee livesafe	\$1299.99 + \$239.00 insurance = \$1,538.99	https://www.dell.com/en-us/shop/dell-laptops/xps-13-laptop/spd/xps-13-9305-laptop/xn9305ezcxstg4
Can be shipped running Windows 10 or Linux Ubuntu	\$390.00 - \$450.00 depending on build	https://www.alibaba.com/product-detail/15-6-gaming-laptop-computer-16GB_62384741407.html?spm=a2700.details.0.0.5ba31a4fFoXo2R

Discussion on Options

The first option we chose was the Macbook Air. This laptop exceeded our requirements for what we thought would be an effective laptop for the Oyster River Middle School students. Out of all the options, the Mac had the joint highest memory at 16 GB. This was the most important factor for us, so it is what put it as one of the top options. The processing speed, as well as the chip, also put this as one of the options. The M1 chip is known to be faster at processing and overall good. The speed of 3.2 GHz makes it a faster laptop with constant speed. The 512 GB SSD was also one of the leading factors to us choosing this laptop. Having the largest amount of storage, along with it being SSD, which allows it to be read and accessed faster makes it a leading candidate. All these add up together to give the students a very nice laptop to last them at least 4 years of middle school and more. The Mac OS provides a simple way for students to learn how to use laptops, and can be easily managed. The warranty that it comes with also is a benefit because it covers 3 years, and for the last year there is enough money in the budget to cover a few breaks. By choosing the Mac option we decided to go for a top end laptop to last the distance over cheaper ones that could be replaced down the line. Apple is a well known brand, and is very reliable when it comes to their products. Even with an additional bonus of each student getting their own set of air pods as a bonus just adds to the value received.

The second option we chose was Dell XPS 13 by Dell. This is due to the Hardware Specifications that meet our and exceed the criteria required for middle school students. The three most important factors needed are Memory, Processor Speed, and Storage amount. The Dell XPS 13 Memory includes 16 GB, LPDDR4x, 4267 MHz, integrated, dual-channel which is more than enough required for middle school students as they are not required to run programs or applications that are RAM hogs and this is more than enough memory to multitask as most students need to when doing assignments or taking notes. The Processor Speed is the highest

of all laptops chosen at 12MB cache, up to 4.7 GHz which is again more than enough for middle schoolers to conduct media editing, rendering videos and images produce heavy strain on the CPU. The Storage type of the Dell XPS 13 is SSD with a Storage Amount of 512 GB CL35 M.2 which is going to be used to hold all their projects, assignments, presentations, and have enough space for anything else school-related needed. The main difference between this and the Macbook is that the Macbook has a great OS for students and middle school students will have an easier time understanding and using the Mac OS. The main difference between the other laptops chosen is that the Dell XPS 13 and Macbook are more trusted and have better specs, therefore, being the first and second options. We chose to spend all our money on this one laptop because we believe it is very durable and will be able to last 4 or even more years until we get more money to buy new laptops and not only that but it will be still a relevant computer even within four years that is why we are going for the best of the best.

The third option we picked was a Laptop by Shenzhen Technologies Co. This is a low-cost, high availability manufacturer of tech products out of Guangdong, China. Their products are very affordable for the specifications provided, and they're rated high on Alibaba(The purchasing site). Their 'gaming laptop' boasts higher than average laptop specs and meets the requirement without issue. It has 8Gbs of RAM by default and can be extended to 16Gbs, either by the manufacturer or after-market. This option would come at an additional cost for the school, however since memory is the most important, it would warrant the most funding overall. It comes with a 1Tb hard drive and has expandable SSD capacity (up to 512Gb). With the excess of storage, the students wouldn't have to worry about it filling up at all, and it could be expanded to a 64-128Gb SSD to handle frequently used program files. The laptop comes with an Intel I7 6500U dual core CPU. It also has an integrated GPU, in addition, because it's a gaming laptop, it has a smaller, dedicated Geforce GPU. These in tandem will be able to handle media processes and editing without an issue. It was around the price of both of the Chromebooks with far superior specs. This was chosen to be our last Laptop option

because both of the other choices are developed by brand name companies. Through the warranty coverage of the previous two devices, the school would have adequate tech support if any issues occurred. Our thought behind this device was "If it breaks, buy a new one". This could run into issues if the device has major integral issues, this could lead to many laptops being needed to be bought, although the manufacturer did have a clause in their mission statement that they would send more copies of the device if there were any defects. For these reasons, we chose this as our third over the other competition.