Interactions Between Prior Exposure to Digital Technology and Cultural Perceptions of Technology
Aarushi Dubey, Dec 2023

INTRODUCTION

As I entered college as a computer science student, I quickly understood that my comfortability with various digital technologies were not reflected so similarly in my peers. While I found ease in understanding a new social media application, I saw my college friends failing to do so at the same pace as I. Though I initially believed this difference to be based on my major being computer science and my friends' majors being non-technology centered, I came to an understanding that rejected this claim - I did not find this contrast in technology comfortability, usage, and skill in my family friends that I grew up around. Upon reflection, I found two commonalities that seemed to be the motivating factors behind us having our level of digital technology skill: we utilized technology intimately during our childhoods (and were introduced extremely early on to it), and our familial cultures were of similar South Asian backgrounds. Though anecdotal, such an experience and reflection are the basis and leading motivations behind my pursuing the following research topic: digital technology understandings of college students.

Specifically, the following paper examines how do **(prior exposure to digital technology concepts)** and **(a student's cultural background & cultural perceptions of technology)** interact with one another to **influence a student's learning skill sets and comfortability with technology** in college through the use of semi-structured ethnographic interviews, from which I find that both factors influence a student's development of technology/non-technology skills and their assumed usage of digital technology for various tasks. Exploring these factors provides insights into how technology and social structures are embedded with one another from an early point of a person's childhood in the 21st century.

LITERATURE REVIEW and RESEARCH QUESTION

LITERATURE REVIEW:

The following section details how cultural perceptions of technology, and cultures' interactions with technology have been previously examined; the following literature finds that cultural lives & systems, in some structural way, influence education curriculum, and influence technology's usage in education. This section also provides an insight into how technology usage in education is influenced by the cultural lives of educators, which can lead to a discriminatory impact on students' benefits resulting from technology usage; hence, furthering the third-level digital divide.

Roger Skophammer notes that interaction between technologies, cultures, and environments results in technology discussions shedding light on cultural lives, and cultural discussions providing insight into technologies currently utilized by a certain demographic (Skophammer, 2012). Robyn Pierce and Lynda Ball found that many math teachers believed that technology usage in a classroom would remove learning time from a class, and simultaneously had the perception that students need to do mathematics by hand before using technology to truly understand concepts (Pierce & Ball, 2009). Betty Collis also analyzed how there is educational potential with access to world-wide-web-based learning sites, but that culture informs how or how much that potential is utilized or recognized (Collis, 1999). Brigid Barron finds through a study that a majority of women who chose to take computer science and programming classes did so due to familial encouragement (Barron, 2004). S. Craig Watkins notes how having access to women role models and instructors in STEM spaces encourages girls to continue or foster interest in STEM and digital technology fields (Watkins et al, 2018).

The following section emphasizes on the recognition in scholarship that the earlier a person is exposed to technology, that the potential for creativity and inventive skill can be

fostered; and, that there is a pushing need for technology awareness for success in current society. The analyses detailed highlight the importance of engaging in the abolition of the third-level digital divide, with possible fallout effects otherwise on children including potential skill loss, or potential career/scholastic failure.

Theodore Lewis notes how creative potential can be cultivated through early introduction of technology to children within technology education (Lewis, 2008). Miftachul Huda and others discuss how exposure to the internet has become necessary due to the utilization of technology in social and economic aspects of a child's daily and school lives, and how technology exposure early on leads to the development of 'adaptive technology skills' (Huda et al., 2017). Cassidy Pucket discusses the criticality of developing technology learning habits that are adaptable to new technologies that may require a variety of changing and new skill sets (Pucket, 2022). Joanna Goode discusses how a lack of a prior-to-college 'strong technology identity' for college students can have strong impacts on the decisions students make socially and academically (Goode, 2010). Jennifer Ashlock and others recognize that early teenagers maintain their computer technology interests and literacy by actively involving themselves in digital technology-related practices in their homes and schools - such as through online gaming (Ashlock et al, 2023).

Notably, as we can see from the above literature review, that in isolation, both cultural perceptions and early technology exposure are recognized as being influential in technology confidence, usage, and success. However, there is a **gap** and very limited work that touches upon how the two factors interact with one another to produce technology skill sets and comfortabilities. Specifically, there is an even less informed view in scholarship on what exactly are the technology outcomes from children being simultaneously touched by cultural perceptions of technology and external technology exposure. Without improving this lack of scholarship on interactions between culture and prior technology exposure, our methods and approaches towards technology education - both through informal methods like parenting and formal methods like schooling - may not address any underlying root issues that are causing the third-level digital divide to persist. If such literary & research gaps do not close, we tiptoe on the dangers of persisting inequalities regarding and surrounding technology interactions that may have life-long impacts or repercussions on a person's technical and social skills - both of which are becoming increasingly relevant to maintaining a livelihood.

RESEARCH QUESTION:

To address the gap in scholarship between technology exposure and cultural perceptions' interactions & influence on college students' skill sets, I put forth the following research question: how do (prior exposure to digital technology concepts) and (a student's cultural background & cultural perceptions of technology) interact with one another to influence a student's learning skill sets and comfortability with technology in college? In order to answer this question, I'm specifically looking to analyze these interactions through ethnographic interviews in order to view undiluted insights of college students and limit my own perceptions from influencing the answer to this research question. This research question is centered around examining how the third level digital divide, which (as defined by Puckett) posits that the same skills and usage of technology does not proportionately output the same successes by various social groups (Puckett, 2022)

METHODS

METHODOLOGY:

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For my study, I have been interviewing research participants who are college students of different majors at the University of Maryland on the College Park campus. I chose to do a proximity sample due to time constraints, and so my participants began with two close friends of mine, and then I allowed snowball sampling to occur where some of my participants recommended other college students on the UMD College Park campus to do the interviews with me. Because I knew the participants somewhat already, my rapport was well-built already, which provided me with greater transparency into participants' sharing stories of their lives - a quality recognized by Berg to be needed when doing effective qualitative interviewing (Berg, 2001). I chose to do semi-structured ethnographic interviews over Zoom calls from whichever personal or public environment the participant wanted to join from. My semi-structured interviews consisted of two essential questions focused around a) prior technology exposure and b) cultural perceptions & influences of digital technology, and then I allowed participants to expand upon their experiences for whatever further information they wanted to provide to me. I noted down my best transcriptions of their answers to my questions, plus any additional visual reactions they made during the interview. I am attempting to do a content analysis on top of the experiences I receive from my ethnographic interviews.

LIMITATIONS:

As I am a college student majoring in computer science, the proximity sample that I initially chose out of was mainly filled with computer science students since the majority of my friends fall in this major. This sampling bias definitely limits the diversity of majors that I could have gained insights from, and computer science majors may have a more distinctive view on how culture and prior technology exposure influences their digital technology knowledge due to it being central to their careers. I also grew up as someone with a strong digital technology exposure before entering college. So, my own outlooks on what should be a 'given' developed skill for digital technology knowledge may vary drastically in comparison to that of the participants that I interviewed. Therefore, it is important for me not to consider a specific marker indicative of technology knowledge, since for different backgrounds, people may have different interpretations of what fulfills those technology understanding expectations. I am also a woman of South Asian heritage, and this background has influenced my cultural perceptions of technology usage and skill strongly.

RESULTS and ANALYSIS

RESULTS:

As a reminder, my research question is to address how do (prior exposure to digital technology concepts) and (a student's cultural background & cultural perceptions of technology) interact with one another to influence a student's learning skill sets and comfortability with technology in college. From my semi-structured ethnographic interviews so far, I found two strong points / trends from my content analysis. The first is that college students having exposure to digital technology-aware communities/people before starting college encouraged and allowed them to develop both technological and non-technological skill sets earlier, which they continue to apply later in their current academic careers. The second point that I recognized is that depending on the cultural perceptions of technology that a student is exposed to within their personal and public spheres prior to college, college students' motivations to understand and use digital technology adjust accordingly.

ANALYSIS:

The first notable point recognized is that exposure to digital technology-aware communities/people before starting college allows college students to develop technology &

social skills that they apply later on in their academic career. One pattern which supported this point is that parental figures & family circles with previous technology knowledge provided college students with resources and motivations to pursue digital technology usage, thereby allowing students to explore how to navigate digital technology and its needed skills early on. For example, interviewees such as P1 stated that "my dad had an interest in technology, so he would buy me new tech devices … or show me the parts of a computer." Interviewee P2 similarly said that "[my dad] got me [a console] to entertain me when in middle school all my friends got xbox - my dad supported me being techy because he's techy." Interviewee P7 also said that "I saw [doing computer science] was doable with my dad." Notably, many parental figures noted to have technology influence were stated to be men, and these three interviewees were also of the same cultural background. In contrast to the three previous interviewees mentioned, Interviewee P6 stated that "if I don't know the answer to a problem … it's really hard since I see all my friends since all of their backgrounds and families have been in the tech industry or are doctors already." The above quotes (and a few others) display how having parental figures with digital technology knowledge in the primary circle of a student's life before college allowed and supported students to learn more about digital technology. Specifically, both exposure to technology concepts *and* encouragement to partake in technology-centered engagements between parents and children seems to be a common experience in those who had early technology exposure. The exposure early on to this digital-technology support cultivated student's with technology interests that carried on into their academic careers. These quotes also demonstrate how those who did not have digital-technology support and exposure early on very demonstrably faced future difficulties or struggles in problem-solving regarding technology issues. However, another interesting comment made by Interviewee P6 is also notable; they said that "my dad kept supporting me because he said there aren't that many women and made me more confident … he was in CS … but it prevented me from learning other stuff like router information because he was always handling things because he knew everything but I don't know because I'm clueless." Such statements show some insights into how prior exposure in your primary circle to those who have technology expertise can be a double edged sword, with some experiences benefiting with developing technology confidence, and other experiences displaying patronization that obstructs further technology learning.

Another pattern supporting the statement that exposure to digital technology-aware communities/people before starting college allows college students to develop technology & social skills that they apply later on in their academic career is that interviewees demonstrated that access to digital and in-person communities that had digital technology knowledge motivated and taught students before college what skills are needed to complete technological and non-technological tasks. Interviewee P4 stated that **"**the ability to ask for help is not something that comes to people easily, and that's something people even struggle now with when it comes to asking TA's, and asking questions is something I got from family friends in technology early on … I learned organization skills regarding structuring code and work assignments since I'd be yelled at for not commenting on my code or organizing it properly for presentations by my uncles." Interviewee P3 stated that they "learned to professionally grow my network" by having access to digital-technology aware people early on. Interviewee P1 also noted that "being able to talk to friends online allowed me to branch out to make new social networks online to interact with about different mediums that I wouldn't normally consume if I didn't have these influences like my friends to talk about different games or different consoles and devices." Interviewee P5 stated that they were "a part of digital communities in the school

itself so that helped [in] talking about computer hardware which put [them] on the path of networking and programming… a lot of it was in the form of learning jargon and having access to conversations in fields that people were knowledgeable with." The above quotes represent how both having access to online and in person communities allowed participants to learn both socio-technical and technical skills & knowledge sets early on (like organizational, querying, or networking skills), which they carried with them into college. Such examples exemplify how having access to any digitally-aware community, whether they be professional or personal environments, allowed students to develop skills and knowledge bases otherwise unknown to them before entering college.

The second point I found from analyzing my interviews was that cultural perceptions of technology influence within personal and public spheres prior to college play a role in college students' motivation to understand digital technology. One pattern which supported this analysis point was that interviewees noted that social media & technology was instrumentally used to convey social capital to peers during early teenage development, thereby giving importance to knowing knowledge of digital technology & social media early on. Interviewee P4 stated that they "grew up with not a lot of family near … so technology and social media was the connections between us and them ... before when my mom came from India to the US, they used landline connections to talk to family back home; now I use whatsapp to communicate with far away people because it became popular on free wifi so I learned how to use it early on because if you weren't on whatsapp then what were you doing haha." Interviewee P2 said that "… having a phone equaled more stable friend groups whereas in elementary school I would have new friends every single year." Interviewee P5 also discusses how they utilized social media more after developing more social groups in high school: "my family… we are considered very private like compared to my extended family like they just put photos up so my interactions on social media were very limited … but going to clubs in high school kind of opened me up to putting information online." The above quotes display how due to community based cultural perceptions & needs of justifying social status, during early teenage development, students were motivated to learn of and how to use digital technology. Due to the cultural perceptions of having digital technology awareness being equivalent to being 'current' with trends across the personal sphere, students have been motivated to understand digital technology early on.

Another pattern I found that supported the idea that cultural perceptions of technology influence within personal and public spheres prior to college play a role in college students' motivation to understand digital technology was that interviewees implicitly and explicitly explained that the cultural importance given by educational institutions to technology usage in various contexts - prior to a student's coming to college - influences a student's want to use or learn digital technology for varied tasks. For example, Interviewee P4 stated that "... the way I work in college right now is heavily based on the fact that we didn't use technology for it in school and we didn't put importance on it culturally so I can do it a lot faster manually than other people." While Interviewee P4 was not as exposed to utilizing technology within early education, Interviewee P2 demonstrated the opposite, and consequently had different future patterns in academic work: "... [I was] exposed to computer science in school when I was in high school so I was using things like an IDE [integrated development environment] which is something I didn't have to learn in college so it was an easier transition." Interviewee P3 also stated that they "had smart boards and tv screens to project laptops on which made learning a lot easier for everyone [in high school]... teachers assumed everyone had computers that people could use at home and given ipads to project onto the screen so now I use ipads all the time to

study." The above quotes display the contrast between the ways that different educational spheres' usage of digital technology for various tasks influenced future usage of digital technology by college students, where the patterns of one student not utilizing technology so much for certain tasks, and another did, continued to adulthood simply from their cultural environment. Such examples emphasize how within the public sphere, an educational institution's cultural perceptions of how digital technology should be used shapes students' perceptions on what they should use digital technology for in the future.

I also found certain quotes by interviewees to be in the center of interactions between prior exposure to technology and cultural perceptions of technology. For example, Interviewee P7 noted that they "noticed in computing classes in class or on youtube … there was always a brown person so it enforced [to them that] like my people do this." Such comments demonstrate how providing resources of technology support in regards to culture-specific support can foster a student's confidence in technology.

DISCUSSION/CONCLUSION

We have seen that previous literature has recognized that both cultural environments and prior exposure to technology play some sort of role in influencing attitudes and usage of digital technology. The aim of this study is to see an insight into how exactly these two factors intertwine & interact with one another in the lives of college students navigating through their academic and social lives, where digital technology has become almost encompassing in so many aspects of their lives, and to have an ethnographic insight into college students' experiences with and without digital technology. The findings of my interviews showcase how cultural perceptions of digital technologies early on play a role in influencing college student's attitudes towards usage of digital technology for different tasks in their college careers. I also find that early exposure through various digitally aware communities allows students to develop technology/non-technology skill sets that they utilize in college later on. These findings scratch the surface on how prior exposure and cultural perceptions (to and of) digital technology are influencing college students throughout their upbringings and development stages, and are important in recognizing to address what social changes or recognitions need to be made to best help college students develop into their best selves before entering adulthood.

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APPENDICES:

Appendix A - Interview 1:

growing up, middle school friends got me into liek gaming and i think my first console growing up was a wii and my parents didnt want too parent me so they got me it ot entertain tme ; but in middle school when my friends got xbox; my dad supproed me being techy because he is techy and being able to tlak to friends online allowed me to branch out to make a new social netowekr online to interact with different mediums that you wouldn't normally consume if you didn thave these influences such as friends talk about different games or different ocnsoles and that device that system; normal tech = being in our generation we grew up on access to technology digital - like ipads, ipod touches; that surrounding and satuartion of tehcnicology influenced me; no one specifically in his social circle made me want to learn more; it was usut more expected of us to know this due ot the time we grew up in growing up in the age we did, it was socially expected for us to know technology; stereotype of you see your grandpa epecteing you to know how to use digital techooogs due to the age and generation; with education, when we were younger, everyone is being forced into STEM and how saaturated the field is now due to this forcing; so being fluent in technology was not just forced because we were born in this generaiton, but also because of education. so learning how to code and going into computer science and stem is the future was so focused upon; pressure from education ; wild that we were pushed into what is consuderedt the efuture; annoying tha tso many peopl eare being pushed into stem; computing as a race: white male dominated field as most stem fields which dissuades a lot of people from joining CS (for at least women); feel discouraged by the system itself; Cs is more accepting fields since people are chronically online; illudicity of the field of computer science; i think ;

Appendix B - Interview 2:

grew up playing the power game explained the financial situation growing up my peers have influenced; when they use their phen and do something cool then i want to do that; when i use social media ; tips and tricks that come up on for your page; ios17 that when you turn it sideways

gives you a calendar; particllly my parents - dad paritcualruty sinc ehe has had an interest in technology like buying new techs like speakers and new phones to play same song at the same time; he showed the parts of the computer; as a chinese person, mother has had a few career goals; so she is a programmer, so she has put me in coding classes at a young age; cat that scratch and block coding has put that on me for computing problem solving; pushed me to do well in math like in chinese school; for social media, community sourrdounded by what predominantly white and competitive socially so everhyone was pressured to look good and wear high end things and to show off to others their social status; social aspect forced me to become comfrotable wtih social media; dont see managers since many are men - not a big issue, but its definitely an impact on how mother complains how the boss isnt the best; as a woman in college in CS where ther are lots of men professors, you dont feel so comfortable going to them for help, so you befriend all the women in your field; as an asian in comp sci, i feel like im the majority since you dont see as many of other races, so its not a big issue for me; but could be area dependent since we are from maryland; social class wise not a big deal to heere at maryland; in ohio you see nepotism more; here everyone is pretty averaged and hard working and work towards what they want; there is deifneitly nepotism aspect in the real world that should be talked about more; junior year everyone younger then me got ipads so people in high school gets apple pencils; and younger children just have access to that till the end of high school career; i know someone just shattered and they jsut replaced it - it would just be free for the whole year; property; cart full of macbooks that would float around the school; cart full of chromebooks but they were not treated properly - overbend chromebooks; money was no issue so it was whatever for many of them; they were richer then me - private jet for graduation trip for their friends; my parents didnt let me have screen time so i played at friends houses since partners didnt like that; stopped going outside more so i developed from allergies ; didnt have allergies till middle school; 8th grade teachers had technology available so they didnt have to figure out how to get children technology; there were extra laptops available for people to use; and had smart boards and tv screens to project laptops on which made learning a lot easier for everyone. teachers assumed everyone hd computers ppl could use at home and given ipads to project onto the screen; ph\one = more stable friend groups ; elementary school - new friend every single year;

Appendix C: Interview 3

grew up in a family with lots of family friends active in tech inundstry, specifically software engineers so it increased my knowledge of career sense in this type of field - like programming languages, what it entails and i knew more about my computer; pushed academically to take programming classes before college that was pushed by my parents and they helped me learn during the summer which allowed to me to know about coding and talking to people aearlier ; allowed me to grow my network and nto necessarily due to tech only people but i learned to professionally grow my network; the ability to ask for help is not something that comes to people easily and thats something people even struggle now with when it comes to asking TA's and asking questions is something i got from tech awareness; orgnaization skills regarding structuring code and work assignments since i'd be yelled at for not commenting on my code or organiainng it properly for peresetnation. social media account since sixthgrade and expectations on app s like indstgarm is really refined and ideas of influencers are standards that you have to try to achieve those standard;s wanted to meet the aesthetics of those social media time; only beautiful parts of your lifes so you dont wantt to show any imperfections; didnt' know what social media was even though i was using it form sixth grade; grew up with not a lot of family near us so technology and social media was the connections between us and them; before when

my mom came from India to the US, they used landline connections to talk to family back home; now i use whatsapp to communicate with far away people because it became popular on free wifi so i learned how to use it early on because if you weren't on whatsapp then what were you doing haha; racial groups such as asian people are often seen as standards of technology like tech support for asian people - cultural has always been integrated into the standards of digital technology that we've had to dealt with everyday .

Appendix D: Interview 4

tech helped a lot; familiar with technology so when you come for school lots of things i take for granted a lot of people we dont put as much effort into; one example is like using a laptop - like we used a bad desktop in school but it still helped me learn skills we used blue jay; exposed to CS in school when i was in high school so i was using things like an IDE which is something i didnt have to learn in college so it was an easier trainstions; we used micsoroft word excel powerpoionts document based application in schools; my family used technology and we had a computer at home and a laptop so i had access to learning these things early on; i think my learning skills like kknowning how to pick up knowledge and tasks faster like going after and so learning process to pick up anything is quicker because i know how to use technology for it; also the fact that when kids are exposed to technology then you get the chance to explore new things which is something mindset that is good to develop and cultivate early on which i had when i had arlhy exposure. in school, we wouldnt use technology for a lot except for CS, and that was instilled in us to not quarry phones to school and so you are learning ad using those ideals in college as well; the way i work is heavily based on the fact that we didn't use technology and we didn tput importance on it cuuturally so i can do it a lot faster then other people; basic skills of like 'i can do this without technology' were emphasized on me culturally as a student. i know how to study and learn without technology and how we consume information like reading i do it non tech wise because at home and and at school it was culutraully empahsiazed to not do so; reading is a big thiing bc it creates issues in college if you have to read a lot but you never learned to because of the cultural importance placed on becoming dependent on technology

Appendix E: Interview 5

i was in middle school i was a part of digital communities in the school itself so that helped me talking about computer hardware which put me on the path of networking and programming. alot of it was in the form of learning jargon and having access to conversations in fields that people wrer knowledgable with; with a lot of people who were 30-40+ about hte fields and helped me learn about non academic topics. a lot of stufetns around me were not technology motivated = very just go to class; select few. one club was cyber patriots and i was in two years and i was predidet so i got to meet list sof interesting people - people working for department of dedense; introduced me to transistors. and for my family we are considered very private so mu interactions on social media are very limited and so its kind of interesting dynamic because my nuclear family is very different from extended family; extends family more hey we put photos online and nuclear was reserved; going to clubs in high school kind of opened me up to putting information online; my dad worked as a technical consultant and he had access to some stuff that i considered super cool when i was a kid and now its small beans but it as so cool like moving a mouse from monitor to monitor; my dad showed remote desktop from pc at home to work and i helped that and that was a learning experience and i had a lot of fun; i knew a lot of people who would not have been as exposed as i was in technology early on because their parents didnt work in that field

Appendix F: Interview 6

my father is a computer science major and he is a CS major so i was pretty exposed to digital technology; my mom didnt so it was opposite end; my dad kept supporting me bcecause he said therere rent that many women and made me more confident and the reason he was in CS was because it was interesting to me but easy at th esame time; and it provided confidence in using technology; prevented me from learning other stuff like router infromatino because he was always handling things because he knew everything but i dont know because im clueless; didnt talk about tech with himi this much because it allowed me to think a bit about hardware; he encouraged to go into apps but i didnt want to because he said to do it; trying to learn more in academics; his confidence pushed me and boosted me to be more involved with tech organization sin high school so i learned about coding and networking basics etc in high school. i feel liek its harder for my family to understand so the reason i want to try something more commercial is because their arent any latinos in CS so everything i have to explain what i m doing in my family to be in digital technology fields you know what i mean; so i wanted to do tha 6but its also very scary but they might be wondering why i study all CS stuff if i dont know the answer to a problem; its really hard since i see all my friends since all of their backgrounds and families they have been in tech or doctors already whereas its more typica for mine to be seamstresses and factory workers; no lation friends that understand the perceptions in each culture the difference in expectation; i want to encourage others such as teaching kids about computer science.

Appendix G: Interview 7

i think my biggest influence is my dad who does the same thing im studying and his conversations about the importance of digital technology and how everyone should be waware of it and its permuetes into every industry; changed my perspective on education like in high school - more technical heavy in college because of my dad; growing up we always have our own competitions since digital computing was the best opportunity and so i think i should realize that people in competition like my dad if youre not cut out to be a doctor; if i didnt have this influence then i would not be in this industry. im not on social media so that woasnt a big influence but i think my ethnicity and socioeconomic cultures were big factors in terms of socieon economic status all the middle class are trying to find jobs that are sustainable so being a doctor when grwonug up that was unknown as not being out of a job so people who cant do extensive studying thei sy o computer science or compute engineering so its figurng out what allows you to survevie in a long term basis and present in our lifetime to feed our kids; no other industry was offering that when i was applhying for coleges so now im already looking for other oppriutninties so i just want to have the choice to use knowledge in diff ; ethnicity-: notinced in computing classes in class or on youtube their was always a brown person so it encorfced like my people do this; so if i was remotely interested in archisteture i wouldnt do that since i didnt see that feasible; want to do something in real world without worrying about what comes after; something i can bare doing not something i hate - i could have done biology and med route and i found that there was enough room to see where i wanna go; have 3 options now not 1; i saw it was doable with my dad