A comparison of costs of two forms of educator professional development in Wyoming: Traditional conference vs. project ECHO

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ARTICLE INFO	ABSTRACT
	Educator professional development (PD) is essential for improving student outcomes (Guskey, 1986, 2002). However, logistical challenges with traditional in-person conferences can detract from the reach of educator PD (Corcoran, 1995; Johnston, 1994; Shaffer & McNinch, 1997; Stephens, 1991). Project ECHO is a model of PD that utilizes videoconferencing technology to provide training to educators in rural or underserved areas through didactic presentations and case-based learning (Arora et al., 2007; Root-Elledge et al., 2018) while eliminating some of the challenges faced by traditional conferences. However, cost comparisons between ECHO and various forms of PD have not previously been considered. The current study utilizes an in-depth cost comparison to examine PD delivered by ECHO relative to traditional conferences. Findings suggest that ECHO is more affordable for funders and attendees overall. ECHO for Education may, therefore, be a useful tool in delivering PD to educators in rural and remote communities.

A student's growth is influenced by the quality of their educators (Guskey, 2002). A skilled educator possesses both content knowledge and an array of teaching methods and strategies (Knowles et al., 2014; NJCLD, 2000). Effective ongoing professional development (PD) provides educators with the opportunity to increase their knowledge and receive training to implement evidence-based strategies and techniques (Guskey, 2002; NJCLD, 2000). Thus, access to continuous, quality PD is critical for improving the quality of educators, and ultimately to improve student outcomes.

Most frequently, educator PD consists of formal sessions or activities at in-person conferences or standalone workshops (Corcoran, 1995). The sessions usually take the form of lectures or seminars with experts presenting content in a slideshow to large groups with minimal interaction. This is sometimes called the "sit and get" approach to PD (Colbert et al., 2008; Sparks, 2004). While PD, in general, has been associated with higher reports of educator self-efficacy, there are several challenges with

this traditional format that have led to increased interest in innovative models of PD. For instance, traditional PD is usually offered at limited times, such as during conferences, which may be too far in the future to meet the immediate needs of participants. As a result, this approach often does not allow for opportunities for follow-up training or ongoing consultation to make the content more applicable for participants (Corcoran, 1995). Also, traditional PD often has no mechanism for ongoing peer collaboration (Colbert et al., 2008; Sparks, 2004) or a way to expand on previous PD sessions to promote a deeper understanding of the strategies presented (Sparks, 2009).

Further, traditional PD has several logistical challenges that may further limit their ability to access traditional PD. First, many teachers have limited time to accommodate events outside of their classrooms, including conferences and other in-person PD. While most certainly due to their dedication to teaching (Cook & Steinert, 2013), this may result in a hesitancy to leave their classrooms for organized conferences

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(McConnell et al., 2013), especially conferences that require overnight or multi-day stay (Shaffer & McNinch, 1997). Thus, educators may be less likely to attend PD sessions outside of their own district when faced with time constraints or commitments.

Second, the monetary costs of conferences and workshops may be another barrier. Cuts to district budgets threaten the creation and maintenance of effective, high-quality PD workshops (Masters et al., 2010) and result in fewer opportunities for educators to receive PD outside of their own district (Colbert et al., 2008). PD and conference activities also introduce costs to districts in relation to educators' time away from the classroom (Masters et al., 2010) as it is necessary to hire substitute teachers to cover classrooms and reimburse registration and travel costs (Fermanich, 2002; A. Odden et al., 2002). Additionally, educators may also be required to pay for at least part of the conference expenses (Corcoran, 1995), which may further discourage participation. Indeed, despite a majority of educators having positive opinions of PD, about half report that costs prevent them from attending the number of conferences that they desire (Shaffer & McNinch, 1997). Additionally, just over 75% of respondents noted that cost played a large role in determining whether or not they would attend a conference (Shaffer & McNinch, 1997).

Third, educators in rural or underserved areas face additional barriers that exacerbate the issues outlined above. For example, with more limited district resources, educators experience even less opportunity for high-quality PD (Kleiman, 2004). Additionally, rural isolation and the great distances between communities often prevents educators from traveling to conferences outside of their local district or county (Johnston, 1994; Stephens, 1991) as well as from traveling to conferences at certain times of the year (e.g., winter; Shaffer & McNinch, 1997). Feelings of rural isolation—especially those in relation to the opportunities for PD afforded by easy access to colleges and universities—can also diminish an educator's motivation to improve their skills and knowledge (Johnston, 1994; Sher, 1978; Stephens, 1991). Unfortunately, local PD opportunities for educators in rural settings are often insufficient without collaboration between local districts and colleges or universities (Corcoran, 1995).

Considering the shortcomings of traditional PD, it is unsurprising that many educators report participating in only the minimum amount of annual PD as required by state laws (Hill, 2009; (NASDTEC), 2004; Parsad et al., 2001). Luckily, advances in technology have afforded rural educators the option to utilize web-based or online PD activities as an alternative to traditional conference settings (O'dwyer et al., 2007).

1. Online PD

Online PD provides a promising alternative to traditional conferences that may overcome many of the barriers outlined above, especially related to physical accessibility for rural educators. Moreover, online PD eliminates the need for travel, which may increase reach and decrease attendee cost burden. Additionally, online PD can result in savings for school districts, as districts can spend anywhere between 2%– 9% of their annual budget on in-person PD (Hill, 2015; Knight & Skrtic, 2021; Miles et al., 2004). This is particularly important as district, state, and federal budgets become tighter (Stone-MacDonald & Douglass, 2015). Some previous research has examined the costs of different forms of PD delivery. For instance, Cavalluzzo et al. (2005) assessed the cost of a five-module, 16-week long online PD course and compared it to predicted costs of in-person PD for the same materials. Keeping course development costs constant across both forms of PD, cost per seat for in-person PD could feasibly range from $137 to $505, depending on enrollment numbers; however, cost per seat for online PD would start at $87.31 and decrease as enrollment rises (Cavalluzzo et al., 2005). Similarly, Knight and Skrtic (2021) examined the cost-effectiveness of an instructional coaching course as an alternate form of in-person PD and found that the annual cost for districts ranged from $4800 to $9500 for each teacher. Using the cost structure framework for effective PD

developed by Odden et al. (2002) which accounts for (1) teacher time, (2) coaching and training, (3) administration, (4) facilities, equipment, and materials, (5) transportation and travel, and (6) related tuition and conference fees, Odden and Picus (2008) estimated district costs of in-person PD to be approximately $14,750 per teacher. Given this information, online delivery of PD displays promise in its improvement of teacher knowledge (Cavalluzzo et al., 2005), scalability (Dede et al., 2009), and de-monopolization of resources that may be otherwise constrained by logistical or fiscal barriers (Dede et al., 2009).

However, online delivery models must still deliver effective training that increases teacher quality. Effective PD should incorporate practices of dialogue, inquiry, and reflection to promote the transfer of information from these sessions back to educators' home classrooms (Hands et al., 2015; Lambert, 2006). Additionally, PD sessions should permit educators to practice what they have learned in front of session facilitators to allow for feedback (Loewenberg Ball & Forzani, 2009; McKeown et al., 2014). Simply put, PD sessions should aim to improve student outcomes by allowing attendees to develop new skills through practice and meaningful discussion instead of merely circulating information and materials about best practices (Garet et al., 2001; Loewenberg Ball & Forzani, 2009; McKeown et al., 2014). While online PD models vary in their ability to deliver effective training, one model has been proven successful due to its unique approach that focuses on community-driven problem-based learning: the ECHO™ model (Arora et al., 2007; Root-Elledge et al., 2018).

2. The ECHO model

Initially created for training medical professionals, the ECHO model is a hub-and-spoke network of PD that combines short didactic sessions with community-driven problem-based learning sessions. ECHO facilitators and content experts (the hub) engage with learners at community sites (the spokes). Each ECHO session includes a didactic session led by the content experts from the hub team and is intentionally short to conform to adult learning theory (Knowles et al., 2014). Following this, a participant from a spoke site shares a problem of practice he or she is currently facing. A facilitator leads the whole network in a problem-solving process that results in a list of recommendations that the presenter can use in their classroom almost immediately. This "all teach, all learn" approach, where both experts and learners share their knowledge with each other, is the mechanism by which the ECHO model demonopolizes specialty knowledge (Arora et al., 2011; Arora et al., 2007). Importantly, ECHO is delivered exclusively over teleconferencing technology, increasing the accessibility of these training while capitalizing on the potential cost-savings associated with online delivery of PD. See Arora et al., 2011; Arora et al., 2007; Arora et al., 2007 for a more complete description of the model itself.

The ECHO model was recently adapted for use in K-12 education (Root-Elledge et al., 2018). After four years of implementation, this model was shown to increase educators' knowledge and skills and have high rates of participant satisfaction (Root-Elledge et al., 2018). Further, this model has been used to address a wide range of training topics, including problem behavioral interventions related to autism, use of assistive technology, positive behavioral intervention and supports, administrator training, improving graduation rates, and classroom management skills (Hardesty et al., 2017; Root-Elledge et al., 2015, 2018). This model is flexible enough to accommodate virtually any skill an educator would learn through traditional in-person PD. However, this approach is distinct from conference-based training and workshops in that it is delivered entirely online, is distributed over an entire academic year, and includes community-driven problem-based learning.

The effectiveness of ECHO for Education, in addition to the accessibility of the model to individuals in rural areas (Root-Elledge et al., 2015), makes it an exciting model to expand teacher capacity in traditionally underserved areas. However, it remains unclear whether the ECHO model has any cost-savings advantage over traditional PD

delivery. To explore the costs associated with ECHO relative to traditional PD delivered at a conference, we compare the actual or estimated costs associated with each PD delivery method. Over the 2017–2018 and 2018–2019 school years, all costs related to implementing ECHO in the state of Wyoming were compared to a three-day traditional state-wide educator conference delivered in the same year. Annual conferences have historically been the main opportunity for Wyoming educators to earn the Professional Teaching Standards Board (PTSB) credits needed to maintain their licenses and the main PD event held outside school districts. Here, we compare the direct operating costs as well as the additional registration and travel costs of both the annual conferences and the ECHO sessions in order to assess the cost burden of each form of PD delivery. Additionally, to develop a more direct comparison of the two forms of PD delivery, we examine the results of a what-if analysis to determine how many days a traditional conference would need to be to deliver the same amount of training as was delivered by ECHO and how much this traditional conference-style event would cost.

Given the accessibility of online delivery of PD, we expect that ECHO sessions are more affordable than a traditional conference event at delivering PD hours and credits to educators. Further, given that additional costs associated with registration and travel are not necessary for ECHO, we expected ECHO sessions to be more affordable to attendees than a traditional conference event. Finally, given the ECHO model's expected cost-savings, we anticipated that if we were to deliver all the ECHO content through a traditional in-person conference (i.e., a hypothetical 'ECHO conference') would be impractical to operate due to length and cost.

3. Methods

The purpose of this study is to determine if PD delivered through the ECHO model is more affordable than a traditional conference. To do this, we examined known operating costs associated with each model, as well as other travel-related costs. We then developed several per-unit comparisons to allow for more direct comparisons of the models. Finally, we conducted a what-if analysis to better understand the practical requirements of delivering PD through ECHO vs. in-person. Details for each are outlined below.

3.1. Operating costs

We first examined the operating costs of each model in terms of three units of measurement. Specifically, we calculated 1) the cost per attendee, 2) the cost per hour of PD, and 3) the cost per credit for each form of PD and each year of comparison (see Eqs. 1–3). Because conferences and ECHO sessions are implemented differently, comparing only total operating costs would be potentially biased. Examining outcomes common to both forms of PD allows for a more direct comparison of costs. Table 1 summarizes the data used for these calculations.

$$Cost\ per\ attendee = \frac{Total\ operating\ cost}{\#of\ attendees} \quad (1)$$

$$Cost\ per\ hour\ of\ PD = \frac{Total\ operating\ cost}{\#of\ PD\ hours} \quad (2)$$

$$Cost\ per\ credit = \frac{Total\ operating\ cost}{\#of\ credits\ offered} \quad (3)$$

Note that in examining the costs per credit, we considered the credits offered by each PD model as well as the credits actually earned by all attendees of each PD model. While the total number of credits earned by attendees of the ECHO sessions was captured, this data is not available for attendees of the annual conferences. Conference attendees must redeem credits individually by submitting a form to the Professional Teaching Standards Board. The Board does not share credit data due to confidentiality policies, and the conference hosts do not have this data. We instead consider two hypothetical situations: one where each attendee earned the maximum credits possible for both events and one where each attendee earned the minimum credits possible for both events, noting that reality probably lies somewhere in the middle. We used the overall operating costs for the 2017–2018 academic year for these calculations (see Eqs. 4–5).

$$Cost\ per\ credit_{max} = \frac{Total\ operating\ cost}{(\#of\ attendees)(\#of\ credits)_{max}} \quad (4)$$

$$Cost\ per\ credit_{min} = \frac{Total\ operating\ cost}{(\#of\ attendees)(\#of\ credits)_{min}} \quad (5)$$

3.2. Registration and travel costs

Additional costs to school districts and attendees were estimated for both forms of PD. Additional costs for registration, mileage, meals, incidentals, and hotel stays were calculated. Miles traveled and hours of productivity lost were also calculated for the time associated with traveling to the annual conference. We referenced an online distance calculator to determine approximate miles and hours traveled by car by each attendee traveling to the conferences (GlobeFeed.com, 2018). Conference registration sales data included the municipality of origin of each participant. We assumed that all attendees traveled by car. To estimate these costs, we referenced the 2017 and 2018 Internal Revenue Service mileage rates for travel cost calculations (IRS,2016, 2017), the 2018 and 2019 US General Services Administration (GSA) meals and incidental expenses (M&IE) rates for Wyoming for per diem cost calculations, and the 2018 and 2019 GSA lodging rates for Wyoming for hotel cost calculations (GSA,2018, 2019). For a summary of these rates, see Table 2.

Note that the annual conferences analyzed here were held during the summer, and all ECHO sessions were helped during planning hours or after school hours. Therefore, we assumed that substitute teachers would not be needed, and such costs were not included in these calculations.

3.3. What-if analysis

Given that these two forms of PD are very distinct, a what-if analysis

Table 1
Data Used in Calculations of Operating Costs.

Comparison	2017–2018 Academic Year		2018–2019 Academic Year	
	Annual Conference	ECHO Sessions	Annual Conference	ECHO Sessions
Overall operating cost	$136,061.91	$518,364.50	$56,073.53	$230,169.65
Attendees	304	2170	426	1997
Hours of PD offered	21	142.5	21	101.25
PTSB credits offered	1.5	10	1.5	7

Table 2
Rates Used for Calculations of Indirect Costs Associated with Traveling to and from the Annual Conference.

Cost Item	FY2018	FY2019
Mileage Rate[a]	$0.535	$0.545
M&IE rate for Wyoming[b]	$51.00 (standard), $38.25 (standard, first and last day of travel)	$51.00 (standard), $38.25 (standard, first and last day of travel)
Lodging rate for Wyoming[b]	$91.00	$93.00

[a] IRS (2016, 2017).
[b] GSA (2018, 2019).

was used to examine the cost of a hypothetical 'ECHO conference' where the same number of PD hours conducted by ECHO sessions are offered in a traditional conference format. To do this, we extrapolated from the known costs of delivering PTSB credits through a traditional conference to the total number of PTSB credits delivered through ECHO in the same year. The hypothetical 'ECHO conference' represents how long a traditional conference would have to be to deliver the same amount of credits as ECHO. This allows for easier conceptual comparison with the annual conference. For this analysis, we consulted with a sales associate for the same venue used by the 2018 annual conference to calculate an estimate of the costs associated with space, technology, and food needed for this hypothetical 'ECHO conference.' We assumed an attendance of 400 attendees since there were just over 400 attendees at the 2018 annual conference.

3.4. Data

All data for this analysis came from administrative data related to the annual conference for Wyoming educators in 2017 and 2018 and records related to the implementation of ECHO in the same years. In all cases, this analysis was limited to teachers from the state of Wyoming (i.e., non-Wyoming-based attendees were excluded). The annual state-wide conference in 2017 had 304 registrants. The 2018 conference had 426 registrants. Actual attendance records were not collected at either annual conference, so the conference host's registration sales data was used as a proxy. These data were compared to ECHO sessions focused on education held during the same academic year (that is, ECHO networks focused on other topics such as healthcare were excluded). There were 2170 ECHO attendees in the 2017–2018 school year and 1997 ECHO attendees in the 2018–2019 academic year. ECHO session attendance numbers are exact and were tracked in a database maintained by the ECHO session facilitators.

No personally-identifying information was used in any of these analyses, and only aggregate data were analyzed. There was no direct contact with any individual from either data source, and all data were collected as part of standard program evaluation procedures. Given this, this work was classified as non-human subject research.

4. Results

4.1. Operating costs per attendee

For the 2017–2018 academic year, 304 individuals attended the annual conference, and 2170 individuals attended ECHO sessions. The annual conference was about twice as costly as the ECHO sessions in terms of the cost per attendee. For the 2018–2019 academic year, 426 individuals attended the conference, and 1997 individuals attended ECHO sessions (see Table 3). The annual conference was again more expensive than the ECHO sessions, though less expensive than the previous year (see Table 3).

4.2. Operating costs per hour of PD

For both years, the annual conference offered each attendee up to

21 h of PD. For the ECHO sessions, attendees were offered up to 142.5 h of PD for the 2017–2018 sessions and 101.25 h of PD for the 2018–2019 sessions (see Table 1). For the first year of comparison, the cost per hour of PD for the conference was nearly twice that of the ECHO sessions. Similarly, for the second year of comparison, the conference was more expensive than the ECHO sessions, though to a lesser degree. In terms of the cost per hour of PD, ECHO is the more affordable PD model. (See Table 3).

4.3. Operating costs per credit

Both forms of PD offered different amounts of credit to attendees. For the annual conference held both years, each attendee could have earned up to 1.5 PTSB credits. For the ECHO sessions, each attendee could have earned up to 10 PTSB credits for the 2017–2018 sessions and up to 7 PTSB credits for the 2018–2019 sessions (see Table 1). For this analysis, we considered both the costs per credit offered to each attendee and the costs per credit earned by all attendees.

When we examined the costs per credit offered, we found that it was 12.0–42.9% less expensive to offer credits via ECHO. For the 2017–2018 academic year, the cost for the conference was nearly twice the cost for the ECHO sessions (Table 3). For the 2018–2019 academic year, the cost for the conference was about $5000 higher per credit than the ECHO sessions (Table 3).

In terms of the credits earned by all attendees, we found that the costs were substantially lower for the ECHO model. At the most, an attendee can earn 1.5 credits at the annual conference and ten credits at ECHO sessions (2017–2018 academic year). If each attendee earned the maximum number of credits offered, the costs per attendee per credit is nearly 12.5 times higher for the annual conference than the ECHO sessions.

PTSB credits are offered at 0.5 credit intervals, so attendees must attend at least 7 h of PD to earn any credit. If each attendee only participated enough to earn the minimum credits possible, the costs per attendee per credit are nearly twice as expensive for the annual conference than for the ECHO sessions (see Table 4).

4.4. Registration and travel costs

Attending any PD event can come with additional costs. Costs for registration, travel, food, and lodging can quickly add up. These additional costs were examined for both forms of PD. For the 2017 annual conference, there were an estimated 280 Wyoming attendees. Each attendee's registration fee came to $175, bringing the total registration costs to an estimated $49,000.00. Registration sales information did not include the price each attendee paid for the 2017 conference. Some registrants may have been eligible for a discount or were waived the registration fee, so this amount is only an estimate.

Out-of-town attendees had additional travel costs to pay to attend the conference. There were 201 out-of-town attendees traveling to and staying in hotels during the conference. It is assumed that these

Table 4
Comparison of Operating Costs per Credit Earned by Each Attendee, Hypothetical Situations.

	Annual Conference	ECHO Sessions
Overall Operating Costs (2017–2018 Academic Year)	$136,061.91	$518,364.50
Hypothetical situation 1: attendees earn maximum possible credits		
Maximum possible credits	1.5 PTSB credits	10 PTSB credits
Cost per credit earned per attendee	$298.38	$23.89
Hypothetical situation 2: attendees earn minimum possible credits		
Minimum possible credits	0.5 PTSB credits	0.5 PTSB credits
Cost per credit earned per attendee	$895.14	$477.76

Table 3
Comparisons of Operating Costs for the Annual Conference and the ECHO Sessions.

Comparison	2017–2018 Academic Year		2018–2019 Academic Year	
	Conference	ECHO Sessions	Conference	ECHO Sessions
Cost per attendee	$447.57	$238.88	$131.63	$115.26
Cost per hour of PD	$6479.14	$3637.65	$2670.17	$2273.28
Cost per PTSB credit offered	$90,707.94	$51,836.45	$37,382.35	$32,881.38

attendees stayed four nights in a hotel during the three-day conference. The costs for hotel stays would be paid by either the school districts or the individuals themselves. These attendees also had mileage costs associated with their travel to the conference location. Out-of-town attendees drove approximately 86,510.8 combined roundtrip miles, and the mileage costs were paid for out-of-pocket or were reimbursed by school districts. The conference registration sales records provided their origin location, so there is high confidence in the calculated miles traveled by participants. School districts or individuals also had to cover the costs for meals and incidentals for three full days and two travel days.

Additionally, we assume that each attendee at the 2017 annual conference paid a registration fee of $175.00. The total additional cost for out-of-town attendees, including registration and all travel-associated costs, is estimated to be $200,751.78, which is being paid for by school districts or the attendees themselves. This comes to a total of $998.77 per person in additional costs. We also note the hours of productivity lost for out-of-town Wyoming attendees traveling to the conference. The cumulative time for all attendees driving to and from the conference came to 1287.87 h. This is equivalent to just over 32 workweeks of productivity lost (see Table 5).

For the 2018 annual conference, there were an estimated 394 Wyoming attendees. Registration sales information did include the exact price each attendee paid for the 2018 conference. Each attendee's registration fee was between $87.50 and $175.00, depending on whether they qualified for a discount, bringing the total registration costs to $42,837.50. There were 371 out-of-town attendees traveling to and staying in hotels during the conference. These attendees also stayed an average of 4 nights in a hotel. Travelers drove an estimated 134,193.2 roundtrip miles to the conference and paid additional costs for meals and incidentals for three full days and two travel days. The total additional costs for out-of-town Wyoming attendees are estimated to be $337,816.79. This comes to an estimated $910.56 per person in additional costs. For those attendees driving to the conference, the hours of productivity lost came to 2095.76 h. This is equivalent to just over 52 workweeks of productivity lost (see Table 5).

In contrast, there were no registration or travel expenses for attendees of the 2017–2018 and 2018–2019 ECHO sessions. Attendees of ECHO sessions are not required to pay registration fees, and Zoom™, the videoconferencing software utilized in ECHO sessions, allows attendees to participate in sessions via phones and computers with no additional costs. Attendees simply click a link to join an online session from their location—whether in their classroom, home, or elsewhere. Further, attendees can call into sessions if videoconferencing is not an option, eliminating the potential costs of expensive internet-capable devices such as laptops or smartphones.

4.5. What-if analysis

A what-if analysis was conducted to see what it would cost to conduct an 'ECHO conference,' where the same number of sessions and PTSB credits offered to attendees in the 2017–2018 ECHO sessions are offered in a conference-style event. Over the 2017–2018 academic year, 114 ECHO sessions were conducted. If six sessions were held each day (for 7.5 h of PD), 19 calendar days would be needed to offer all 114 sessions. We consulted with the sales associate of the same conference space used for the 2018 annual conference to calculate the estimated costs of this hypothetical 'ECHO conference.' We also included the same meal program provided to attendees as the 2018 annual conference: beverage service all day each day, breakfast and lunch buffets each day, and one reception event that included food platters, cold beverages, and a cash bar staffed with bartenders. The operating costs for space, food, beverage, and reception fees came to $311,385.00.

Most conferences charge a registration fee to recoup at least some of the costs of hosting the conference. The registration fee needed to recoup only the conference's direct cost and not bring in a profit to be used for other programming, salaries of conference employees, or speaker honorariums would come to $778.46 per conference attendee, based on an assumed attendance of 400 educators.

This registration fee alone might be prohibitively expensive for educators. However, we assume that this fee does not keep educators from attending this 'ECHO conference for the purpose of this analysis.' Since there were just over 400 attendees at the 2018 annual conference, we assumed an attendance of 400 Wyoming educators at our' ECHO conference.' Out-of-town attendees would incur additional costs for attending. We assumed 377 attendees would be from out-of-town. This assumption is based on the percentage of out-of-town attendees at the 2018 annual conference; 94.2% of Wyoming attendees were out-of-town attendees.

Out-of-town attendees would spend 20 nights in a hotel while attending this conference. These out-of-town attendees would also drive many miles and lose hours of productivity while traveling to the conference. The estimated roundtrip miles that would be driven, assuming only one trip taken during the 19-day hypothetical conference, are 108,576 miles. This is equivalent to driving from New York City to Los Angeles nearly 40 times or making approximately 4.4 complete trips around the Earth. The estimated roundtrip hours (i.e., hours of productivity lost) is 1696.5 h. This is equivalent to just over 42 workweeks of productivity lost. The registration fee plus all travel expenses (hotel, mileage, meals, and incidentals) brings the total indirect costs for out-of-town attendees to $1432,947.78. This would mean that school districts or the individuals themselves would be paying an additional $3800.92 per person to attend this 'ECHO conference' (see Table 6).

5. Discussion

As hypothesized, ECHO sessions presented from 2017 to 2019 are more affordable than traditional conferences at delivering PD hours and

Table 5
Additional Costs Associated with Attendance at the Annual Conference and the ECHO Sessions.

	2017–2018 Academic Year		2018–2019 Academic Year	
	Annual Conference	ECHO Sessions	Annual Conference	ECHO Sessions
Out-of-town attendees	201	1458	371	1192
Hotel costs	$73,164.00	$0	$138,012.00	$0
Mileage costs	$46,283.28	$0	$73,135.29	$0
Meals and incidentals costs	$46,129.50	$0	$85,144.50	$0
Registration costs, out-of-town attendees	$35,175.00	$0	$41,525.00	$0
Total indirect costs	$200,751.78	$0	$337,816.79	$0
Cost per out-of-town attendee	$998.77	$0	$910.56	$0
Roundtrip miles traveled	86,510.8 miles	0 miles	134,193.2 miles	0 miles
Roundtrip hours	1287.87 h	0 h	2095.76 h	0 h

Table 6
Additional Costs Associated with Attendance at a Hypothetical "ECHO Conference", 377 out-of-town attendees.

Additional Cost	Amount
Hotel	$686,140.00
Mileage	$59,713.92
Meals and incidentals	$394,153.50
Registration costs per person	$778.46
Total additional costs	$1432,947.78
Cost per out-of-town attendee	$3800.92
Roundtrip miles traveled, one trip	108,576 miles
Roundtrip hours, one trip	1696.5 h

credits. While the overall cost to implement ECHO over the two academic years reported here is nearly four times the cost of the annual conference (see Table 3), the ECHO model allows attendees to earn significantly more PTSB credits (7−10) than the annual conference (1.5). The ECHO sessions also had a significantly higher number of attendees than the conferences. Thus, in terms of cost per attendee, cost per hour of PD, and cost per PTSB credit, the ECHO sessions are more affordable than a traditional state-wide conference, making PD more accessible to educators. Additionally, the ECHO model had fewer additional costs to participants than traditional conferences, such as travel costs and registration fees. Educators attending the annual conferences had to consider registration fees, hotel costs, travel costs, extra meals, and incidentals, as well as hours of productivity lost in their decision to attend. However, ECHO sessions introduce no additional costs to participants, which increases its efficiency.

Further, in considering what it would take to offer the same amount of PD that was delivered through ECHO as a traditional in-person conference-style event, predictions were confirmed that hypothetical costs would far exceed the projected costs of a typical annual conference. In other words, ECHO sessions in their current form provide a significant economic advantage to attendees: the operating cost of a hypothetical ECHO conference was projected to be $311,385, and additional costs for travel and registration came to approximately $3800.92 per attendee. Additionally, conference attendance results in thousands of hours of productivity lost for individuals and school districts as educators travel to and from the conference location. ECHO sessions allow educators to attend and participate in PD without necessitating additional time- and productivity-related costs. Further, educators in rural areas often cannot travel the necessary distance to attend conferences due to time constraints, weather, costs, or other commitments (Johnston, 1994; Stephens, 1991). With the videoconferencing tools utilized in the ECHO model, participants can join sessions remotely without worry over travel or accessibility.

Given this, ECHO for Education appears to be an essential tool to efficiently deliver a large number of PTSB credits, especially to educators who live in remote and isolated communities. The relative costs of ECHO relative to traditional PD methods could be particularly important for states that have high proportions of rural schools. Additionally, organizations sponsoring PD for educators can enjoy significant cost savings when utilizing the ECHO model. The ECHO model demonstrates an economy of scale where there are little to no additional costs to the program as more attendees participate. In contrast, costs for space, food, and other logistics can quickly increase for the traditional conference-style PD event as attendance increases. This is particularly promising for state and national agencies mandated to offer PD while operating on small budgets.

While the efficiencies of ECHO make it an attractive option for school districts with limited resources, it is important not to think of ECHO as a replacement for traditional PD but as a compliment. That is, there is ample reason to continue to offer in-person conferences. For example, conferences allow colleagues to connect in ways that ECHO is not capable of offering. ECHO cannot recreate hallway conversations, meeting for meals, and other social aspects of conferences. Further, having a sustained period of time that attendees can engage with a conference theme can provide synergistic opportunities to develop new and innovative teaching approaches. Given this, we do not suggest that ECHO should be used in place of traditional conferences, but rather added as one of several methods to support educators' ongoing development.

5.1. Limitations

The current study has some notable limitations. First, exact attendance numbers for the annual conference in both 2017 and 2018 are unknown as attendance records were not collected or shared. However, registration sales data were available and were utilized to determine

estimates of attendance. Additionally, it is unlikely that attendance numbers were larger than the projected estimates. It is possible that some individuals who registered early ultimately did not attend due to scheduling conflicts or illness.

Second, no studies have previously examined the specific costs of providing ECHO sessions. Therefore, the costs of the ECHO sessions conducted in Wyoming may not generalize to other locations. However, given that this adaptation of the ECHO model for education is the first of its kind and that the fidelity of the original ECHO model is maintained in this adaptation (Root-Elledge et al., 2018), it is assumed that the estimated costs used here are a reasonable estimate of relative costs and can, therefore, be used to determine relative efficiency. Nonetheless, future research should investigate cost comparisons with numerous conferences and other forms of educator PD to determine if the ECHO model proves more affordable and accessible across different geographical locations and settings.

Thirdly, we wish to acknowledge that our estimates of costs for ECHO participants does not include costs for phones/computers/ internet nor the potential costs of care of dependents or income lost from secondary jobs. For the ECHO program in Wyoming, these costs were not considered because ECHO sessions were carefully planned with schools and local districts to coincide with school hours and planning periods, specifically to avoid the additional time and monetary costs to participants that would be associated with attending PD outside of work hours. We also acknowledge that the majority of participants received the support of their school's administration to attend ECHO sessions during the school day. Programs considering implementing the ECHO model for educator PD outside of school hours should weigh the additional costs to participants, and we would recommend collaborating with schools and districts in the implementation of an ECHO program. The relationships we forged with schools and local districts was critical to the success of the ECHO program in Wyoming and to the minimization of participant costs.

5.2. Lessons learned

Evaluating the costs of a new mode of PD requires creative thinking and problem solving. After all, the ECHO model is very different from a traditional PD conference. How do we begin to compare the two? Is it enough to identify common outputs and conduct cost-per-unit-output calculations for both forms of PD? Is this truly a fair comparison? The experiences of the learners and the scope and aims behind each mode of PD are so very different – are we attempting to compare apples and oranges? We debated and asked ourselves many questions like these throughout this study before landing on an elegant, yet simple, solution.

The what-if analysis we conducted offers an insightful comparison that we've not yet seen replicated in other studies and evaluations. Imagining the delivery of the outputs from the new mode of PD (i.e., the ECHO model) through the more traditional approach (i.e., the annual conference) not only converted our orange into an apple and allowed for more direct comparisons between the two modes of PD, but illustrated the strengths and benefits of the ECHO model much more clearly than typical economic analysis procedures. In fact, we would argue that, without the what-if analysis, we would be missing a critical piece of the puzzle. Without the insight from the what-if analysis, we would not fully understand the ECHO model's economy of scale and the potential implications it has for improving and expanding educator PD programming.

5.3. Reflexivity

While the authors approached this examination with the intention to objectively demonstrate the cost-savings of the ECHO model, we recognize that our positions within the ECHO program may have introduced a bias, or, at the very least, a kind of conflict of interest. A few of the authors were central in the adaptation of the ECHO model to

teacher PD, and all authors have played a role in demonstrating the ECHO model's effectiveness as a mode of teacher PD. However, the study in this paper was motivated by a genuine interest to know how the program costs compared with annual conferences, the primary mode of PD that teachers were receiving in the state of Wyoming.

The authors also have a commitment to social justice and advocating for disadvantaged groups within our state. This includes our educators in more isolated and rural regions within Wyoming. After examining the findings of our study, we felt it important to highlight the cost-prohibitive nature of conferences in rural and frontier areas for attendees who are asked to cover costs personally. Part of our motivation for conducting, and subsequently publishing, this study was to interrogate the privilege of some, highlight inequities, and offer a professional development solution that has the smallest economic and time impact on participants, with the hope that state education offices and other organizations would consider options that offer the broadest reach with minimal costs to educators.

6. Conclusion

There has been a call to action to rethink the current educator PD approach (Corcoran, 1995; Covert et al., 2006; Garet et al., 2001; Tour, 2017). The ECHO model of PD is a viable, accessible, and affordable option to increase the effectiveness of educators in rural communities (Arora et al., 2007; Root-Elledge et al., 2018). Large amounts of credits and PD hours can be delivered through ECHO at a fraction of the cost of in-person training. With the complexities that teachers face inside the classroom, accessing quality PD should be one less hurdle to properly serving their students. We suggest that the ECHO model is one solution. With the opportunities for on-going collaboration, practice, and feedback that the ECHO model offers, in addition to its ease of access and affordability, state and local education agencies can use the ECHO model as another tool to improve their teacher workforce.

Ethics approval

This study is classified as non-human subject research. No personally identifying information was used in any analyses, and only aggregate data were analyzed. There was no direct contact with any individual, and all data were collected as part of standard program evaluation procedures.

Consent to participate and publish

Informed consent to participate and to publish was not needed for this study. This study is classified as a non-human subject research. No personally identifying information was used in any analyses, and only aggregate data were analyzed. There was no direct contact with any individual, and all data were collected as part of standard program evaluation procedures.

CRediT authorship contribution statement

Sarah Zlatkovic: Conceptualization, Methodology, Formal analysis, Data curation, Writing – original draft. **Haley Sturges:** Writing – original draft. **Ethan Dahl:** Writing – review & editing. **Canyon Hardesty:** Project administration, Funding acquisition, Writing – review & editing. **Sandra Root-Elledge:** Project administration, Funding acquisition. **Eric J. Moody:** Conceptualization, Writing – review & editing, Supervision, Project administration.

Conflicts of interest/competing interests

The authors have no known conflicts of interest to disclose that are relevant to this content of this article.

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