

# UNDERSTANDING TEACHER PERCEPTIONS OF ASSISTIVE TECHNOLOGY

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## 0) BACKGROUND INFO

- AT (Assistive Technology): Assistive technology (AT) is any technology that allows an individual with a disability to increase, maintain, or improve their functional capabilities.
- Examples: programs that can convert printed text to voice, that can help students organize their writing, that can convert information spoken by students into text on their screen
- Definition of AT in the paper: “Not all AT is high tech, but for the purpose of the present study, AT will refer to those technologies that are computer based.”

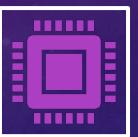
# 1) ABSTRACT



This research examined teachers' perceptions of assistive technology (AT) and the factors correlated with the perceived usefulness of AT.



A mixed methods design that included a survey consisting of open- and closed-ended items elicited information about teachers' AT knowledge and training, and much more.



In the last 15 years, there has been an enormous increase in the availability of computer-based AT.



AT is designed to allow students to gain independence and is typically meant to be a tool that individuals with specific learning challenges can use throughout their life



The present study sought to answer the following research question: What variables contribute to teachers' perceptions of the usefulness of AT?

## 2 ) ABANDONMENT OF AT

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- McIntosh : Students abandon AT for a variety of reasons, including lack of training, perceived stigma, the self-perception that they are cheating, the effort required, previous negative experiences with AT, and the stages of grief surrounding their diagnosis.
- Sharpe : Initially teachers use AT because they perceive it as valuable for their students. Consequently, however, lack of time and of technical training and support problems often lead to the discontinued use of AT in their classrooms.
- Rintala : Students who used AT more often were more likely to have teachers who were comfortable with and interested in using AT and this teacher comfort with AT seemed to have the greatest impact on whether students who were assigned AT would actually use it.
- Lee and Vega : Largest barrier to AT use was a lack of teacher training on AT. In their study, only 24.7% of teachers reported that their teacher education programs had provided them with adequate training on AT. They also found that those teachers who had received more training in AT were more likely to report that AT played an important part in the daily routine of their students.
- Flanagan, Bouck, and Richardson : Among special education teachers, confidence, knowledge, access to AT, and experience with AT encouraged the implementation of AT.

### 3 ) TEACHER PERCEPTION OF TECHNOLOGY

The independent variables that will be examined in the present study include computer literacy, AT knowledge and training, administrative support for AT, and perception of usefulness of teachers.

## 3.1 - COMPUTER LITERACY

- Computer literacy involves one's understanding of how to use computers and can include how to turn on the computer, how to use particular software tools for their intended purpose, and how to create and communicate using computers
- To properly implement AT, teachers must understand how the AT can be used and how to troubleshoot student problems with computers quickly

## 3.2 - AT KNOWLEDGE AND TRAINING

- In a survey, Zhou et al. : 59.3% of teachers reported no to some confidence with AT regardless of the perceived usefulness of AT for their students. Younger teachers were typically more confident with using AT than older teachers and participants were most confident when they were able to collaborate with other teachers when using AT.
- Teachers who perceive AT to be effective for students with high-incidence disabilities, like specific learning disorders, and who are confident using the AT themselves are more likely to implement it.
- Mundy, Kupczynski, and Kee : teachers who were trained extensively on technology implementation were more likely to implement the technology effectively and that teacher training is in fact the most important factor in technology implementation.



## 3.3- ADMINISTRATIVE SUPPORT FOR AT

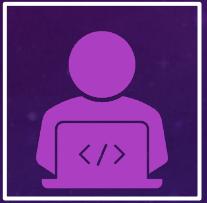
- Schlosser et al. : training the school team allowed for the effective integration of the AT and promoted student participation, suggesting that a targeted approach, involving all team members may be effective

### 3.4- PERCEPTION OF USEFULNESS OF AT

Nam, Bahn, and Lee : the factors influencing AT abandonment were quite different from those affecting the use of general technology.

Result demonstrability affected perceived usefulness of AT. result demonstrability affected the likelihood that teachers would use the AT again in the future; if the AT was too hard to use, they did not use it again

## 4) OBJECTIVE AND HYPOTHESES



**The First Objective**  
which of the independent variables (computer literacy, AT knowledge, AT training, and administrative support) were related to the dependent variable



**The Second Objective**  
determine whether younger teachers had higher levels of computer literacy or AT knowledge than older teachers.



**The Third Objective**  
understand how teachers view administrative support at their school.



**The Fourth Objective**  
determine what factors teachers report as hindering their use of AT in the classroom.

## 5 ) METHOD

A concurrent complimentary mixed methods design was chosen to examine the previously cited objectives.

An online survey of Ontario teachers of Grade 6–10 students was conducted to learn about use of and perspectives on using AT in classrooms.

Design : allowed teachers to provide more comprehensive information about factors influencing their use and perceptions of AT in the classroom beyond what has been previously studied.

Purpose : attain data with a low response time and at a low cost. The survey included a mix of open- and closed-ended questions with dominance of closed-ended questions.

## 5.1- PARTICIPANTS AND PROCEDURE

Teachers were invited to participate in the study through an e-mail sent to the Learning Disabilities Association of Ontario chapters, the Association for Special Education Technology, and graduates from the Master of Education and Master of Arts in Child Study and Education programs at the Ontario Institute for Studies in Education.

In total, 33 teachers responded to the survey. Data from 24 teachers (92% female, 8% male) were included in the analysis

## 5.2 ) DATA ANALYSIS

- A linear regression was also conducted to investigate whether or not the independent variables that were significantly correlated with perceived usefulness of AT predicted the dependent variable.
- Frequencies and percentages were calculated for these open-ended responses and ranked items to determine the factors that teachers reported as hindering their use of AT in the classroom.
- The first author familiarized herself with the data and generate initial codes for the data. A member of the research team used the preliminary codes to work through the qualitative data and to assign codes to the data. Instances where there was disagreement between the two researchers were discussed until a consensus could be reached.

**Table I.** Internal Consistency Analysis.

Scale	Author(s)	Reliability Statistics	
		Cronbach's $\alpha$	Items (N)
Student demographics	N/A	.83	11
Computer literacy	N/A	.92	9
AT knowledge and resources	Lee and Vega (2005)	.94	17
AT skills	N/A	.90	21
Perceived usefulness	Nam, Bahn, and Lee (2013)	.85	8

Note. Internal consistency (Cronbach's  $\alpha$ ) based on the current study data.  
AT = assistive technology.



## 6) RESULTS

- The results of the present study indicated a number of interesting findings. Teachers had diverse views on AT implementation and a variety of experiences with and knowledge of AT.

## 6.1- CHARASTERICS OF STUDY PARTICIPANTS AND THEIR STUDENTS



A large majority of the teachers in the present sample were currently teaching at least one student with an IEP. There was an average of eight students with IEPs per teacher with a range of 2–25 students.



One teacher reported that she taught a special education class in which all 25 of her students had IEPs, but the most common response was 2 students with IEPs; A smaller majority of participants also reported that they were currently teaching students with personal AT provided by the school (70.8%), with an average of three students with individual AT provided by the school per teacher.

## 6.2- VARIABLES RELATED TO AT PERCEIVED USEFULNESS

### Computer literacy

A significant positive linear relationship exists!

The population correlation is significantly different from zero. In the population, teachers who have higher levels of computer literacy perceive AT to be more useful.

### AT knowledge

A significant positive linear relationship exists!

The population correlation is significantly different from zero. In the population, teachers who have higher levels of AT knowledge perceive AT to be more useful.

### Administrative support

Not a significant linear relationship!

The population correlation is not significantly different from zero. In the population, teachers who have higher levels of perceived administrative support for AT do not necessarily perceive AT to be more useful.

### AT training

Not a significant linear relationship!

The population correlation is not significantly different from zero. In the population, teachers who have more training experiences do not necessarily perceive AT to be more useful.

## 6.3 - TEACHERS' COMPUTER LITERACY

- Teachers had, on average, intermediate computer literacy with a number of common computer skills and applications.

**Table 2.** Correlations Between Years of Teaching, Computer Literacy, and Average AT Skills.

Factor	Years of Teaching	
	r	p
Computer literacy	.03	.905
Average AT skills	.48	.023*

Note. NOT = 23 for all computer literacy and N = 22 for average AT skills analyses. AT = assistive technology.

\* $p < .05$ .

## 6.4 - TEACHERS' AT KNOWLEDGE & SKILLS

Teachers had, on average, intermediate AT knowledge. It was expected that teachers with fewer years of experience would have higher levels of self-reported AT knowledge; however, **years of teaching were not significantly correlated with AT knowledge**

Despite all teachers meeting at least basic computer literacy, teachers' self-reported average skills on a number of AT tools were in the poor range. Therefore, computer literacy was not significantly correlated with AT skills

Additionally, although it was expected that teachers with fewer years of experience would be more proficient on AT, **years of teaching was significantly positively correlated with AT skills.**

## 6.5 - PREDICTING AT PERCEIVED USEFULNESS



Given the two significant correlations with perceived usefulness (computer literacy and AT knowledge), a multiple linear regression was performed to explore the relationship among computer literacy and AT knowledge, as predictor variables, and perceived usefulness of AT



Therefore, it can be concluded that the items related to computer literacy did not add any significant predictive power to perceived usefulness in addition to AT knowledge. Overall, the results indicated that AT knowledge significantly predicts teachers' perceived usefulness of AT.

## 6.6- TEACHER PERCEPTIONS OF AT TRAINING

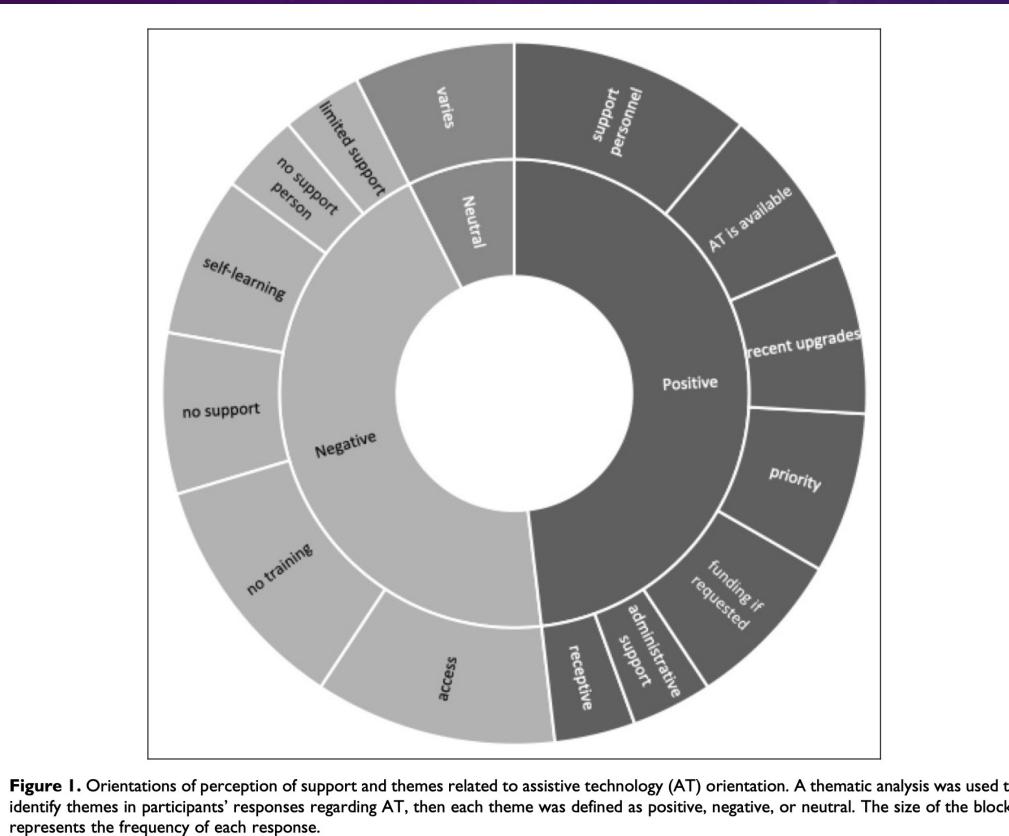
**Table 3.** Qualitative Thematic Analysis and Frequencies.

Theme	Example Response	Themes	
			Number of Participants Who Indicated Each Theme (n)
<b>Technology implementation</b>			
Access	"We don't have enough computers or even working computers for teachers and students"	11	
Advertisements	"Advertisements"	1	
Hardware	"Kids tripping over projector cords and unplugging it"	6	
Internet	"Internet not always working"	11	
Software	"Not being able to install programs that I need (having to go through the IT department)"	6	
Speed	"Slow processing speed"	4	
Student factors	"Students (not) remembering their passwords"	2	
Support	"Waiting for repairs"	1	
Training	"Access for all students and easy to use"	2	
<b>AT implementation</b>			
Access	"Quantity of devices"	2	
Hardware	"Old tech"	1	
Internet	"They do not connect to the internet reliably"	2	
Software	"Voice recognition programs are not great"	4	
Student factors	"Teaching students how to use them independently and having buy in from students"	7	
Time	"Lack of planning/prep time to adequately support students using AT for my lessons (e.g., prepping text documents for Google Read/Write, translating assignments and vocabulary for ELL students)"	2	
Training	"Not enough PD—I often have to teach myself how to use new assistive technology programs"	6	

Note. These are the examples of responses from the open-ended survey items. Examples were selected to reflect the prototypical response. Participants' responses may refer to more than one theme. AT = assistive technology. ELL = English Language Learner; IT = Information Technology; PD = Professional Development.

- A qualitative analysis revealed that lack of training on the use of AT was one of the most common problems, indicated by 33.3% of participants.
- Only 29.2% of participants recalled learning about AT during their teacher education program.
- Almost half of the participants (45.8%) had attended at least one conference or talk focusing on AT.
- It appears that despite some opportunities to learn more about AT (e.g., conferences), teachers are reporting that they need additional training on AT.
- The majority of teachers who discussed AT training (four of six) focused on student training rather than their own knowledge and skills.

## 6.7- TEACHER PERCEPTIONS OF AT RESOURCES AND SUPPORT



## 6.8 - OTHER FACTORS INFLUENCING USE OF AT

- The most common theme with implementing AT in the classroom were student factors: student motivation, stigma, students not charging their devices, misuse of AT, and other logistical factors.
- Overall, there were many reported difficulties with implementation; however, assisting students individually or providing differentiated support was the most common response indicated, (45.8%)
- Themes present in teacher responses about instructional technology focused mainly on Internet speed, access to technology software, and the physical hardware available, whereas when asked about AT, teachers focused on student factors and student training as the major difficulties.

**Table 4.** Factors Discouraging or Encouraging the Use of AT in the Classroom.

Most Important Factor	Percent of Respondents (%)	Frequency (n)
<b>Discouraging use of AT</b>		
Little support on how and when to use it	20.8	5
Could not figure out how to use it quickly	16.7	4
Difficult to use during instruction	12.5	3
Requires additional time to set up and use	12.5	3
Difficult for student to use	8.3	2
Need additional products/computers to use the technology	8.3	2
No knowledge of how to use the product or what it is for	8.3	2
Additional training	4.2	1
High cost	4.2	1
<b>Encouraging use of AT</b>		
Assist students individually	45.8	11
Increases learning	20.8	5
Ease of use for students	8.3	2
Easy to use, user friendly	8.3	2
Know what product is for and how to use it	4.2	1
Little extra training is needed	4.2	1
Overall cost is worth the benefits or gains it gives the students	4.2	1

Note. Participants were asked to rank the most important factor encouraging and discouraging the implementation of AT into their classroom. Percentages refer to the percentage of total participants who selected each option as the most important factor. One missing value from each scale. AT = assistive technology.

# CONTRADICTIONS BETWEEN PAPERS

UNDERSTANDING TEACHER PERCEPTIONS OF AT	OTHER PAPERS
AT knowledge is positively correlated with years of teaching, it appears that the more years of teaching experience a teacher has, the more exposure to or the more opportunities they have to learn about AT	Zhou et al. - younger teachers may be more confident using AT because their teacher preparation program included training in AT whereas older teachers' training did not
perceived administrative support does not significantly correlate with perceived usefulness of AT, and further, no teachers reported that administrative support contributed to their implementation of AT in the class- room	Copley & Ziviani - administrative support for AT was a factor in its implementation

## 7 ) DISCUSSION

- The quantitative results demonstrated that AT knowledge, rather than training experiences themselves, correlated with perceived usefulness. The majority of teachers focused on student training in their responses.
- Given that teachers have reported lack of training as a barrier, that AT knowledge predicts perceived usefulness of AT, and that previous studies have found that short-term interventions were not sufficient for teacher training), it follows that they would not be wholly successful for students
- Even though years of teaching experience were positively correlated with AT knowledge, teachers in general still reported a lack of knowledge about AT. Perhaps this echoes the finding by Margolis and Goodman that teachers often feel that they are only being trained on the basic functionality of the AT rather than on effective implementation strategies.

## 7 ) DISCUSSION (CON'T)



Perceived administrative support does not significantly correlate with perceived usefulness of AT, and no teachers reported that administrative support contributed to their implementation of AT in the classroom



Copley & Zivian: administrative support for AT was a factor in its implementation. “little support on how and when to use AT” was the most commonly selected option, which appears to be in contrast with the above results. Perhaps teachers conceptualized support beyond just the administrative angle within the other studies or scales.

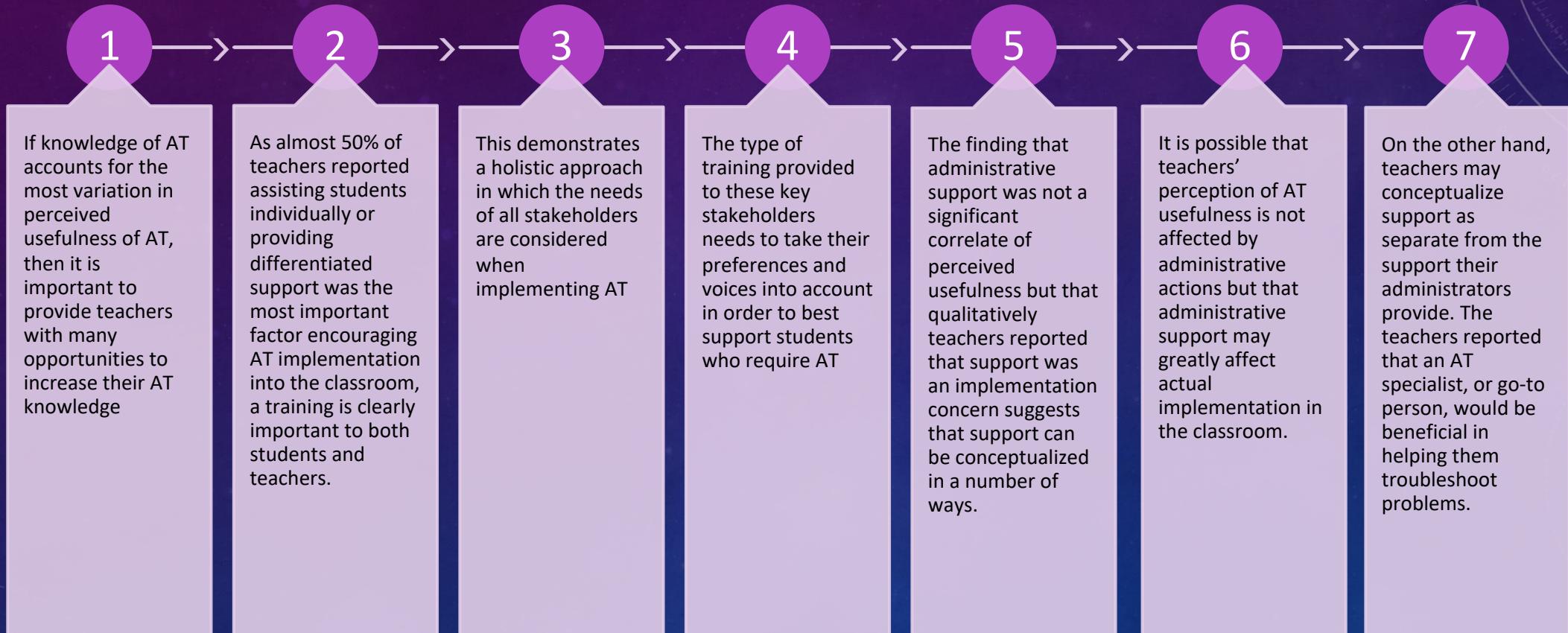


It appears that teachers are not looking to administrative staff for support with AT. Rather they value the guidance of other professionals, like AT consultants.



There is a clear need for greater AT knowledge among teachers, especially those teachers who are early in their career. A focus on AT should be included in preservice teacher education programs and teachers should be provided professional development on AT throughout their career.

## 7.1 - IMPLICATIONS



## 7.2 - LIMITATIONS AND FUTURE DIRECTIONS



Due to the limited sample size, there could have been a lack of variability in responses to some items, leading them to not reach significance as predictors of perceived usefulness even though previous research found them to influence implementation.



Overall, the sample size of the present study may have contributed to a lack of power and dictates the need for replication with a larger sample.



Therefore, the finding that AT training was not related to perceived usefulness of AT should be interpreted with caution and future research should likely include more diverse training experiences as part of their operationalization.

## 8) CONCLUSION

- Results of this study suggest that AT knowledge correlates with teachers' perception of the usefulness of AT.
- There are also other barriers to implementation, including lack of training, student factors, and the software or devices themselves, though these factors require greater investigation.
- It is also clear that teachers are not receiving enough training on or exposure to AT during their teacher training and that changes to this preservice teacher education and professional development are warranted.
- Supporting students with learning challenges is critical to their academic success, and in general, AT is not being implemented in the most effective way.

