Enhanced Verbs for Bloom's Taxonomy with Focus on Computing and Technical Areas
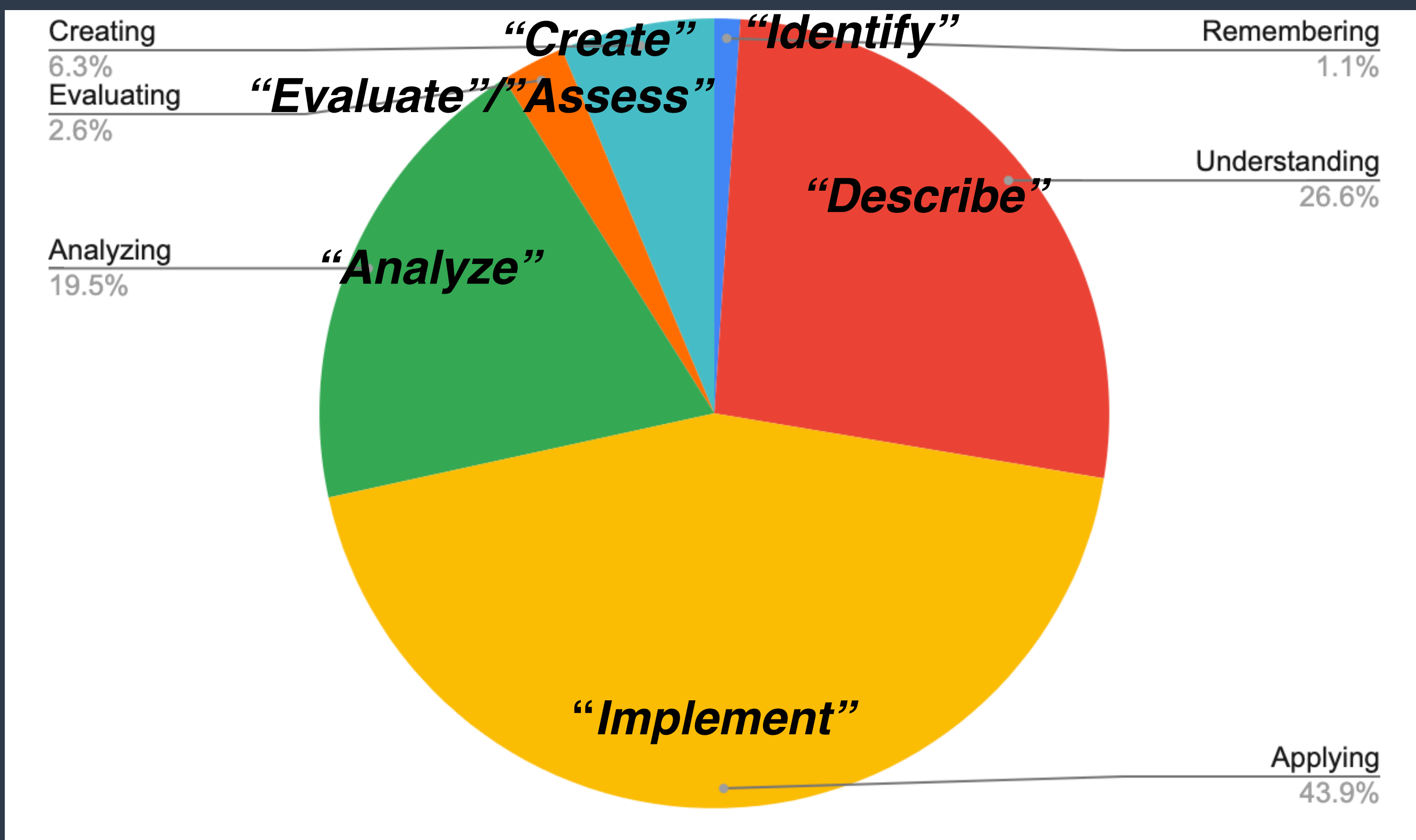
Christian Servin, Cara Tang, Markus Geissler, Melissa Stange, and Cindy Tucker
ACM Committee for Computing Education in Community Colleges (CCECC)

Abstract

The Bloom's Revised Taxonomy framework lists many verbs that can assist in measuring learning outcomes and competencies and creating evaluation rubrics. The recent emerging computing areas ought to enhance the existing list of verbs in *Bloom's Revised Taxonomy*. This poster presents 85 possible verbs to enhance the framework, 34 of which are technical verbs related to computing areas. Educators from two- and four-year institutions can benefit from the enhanced verbs proposed in this work to include in their computing programs.

Bloom's Revised Taxonomy

Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Define	Classify	Apply	Analyze	Appraise	Assemble
Duplicate	Convert	Calculate	Attribute	Argue	Construct
Find	Demonstrate	Carry out	Categorize	Assess	Create
Identify	Describe	Diagram	Compare	Choose	Design
Label	Differentiate	Execute	Contrast	Critique	Develop
List	Discuss	Execute	Decompose	Debate	Devise
Locate	Exemplify	Illustrate	Deconstruct	Defend	Formulate
Memorize	Explain	Implement	Deduce	Estimate	Hypothesize
Name	Infer	Investigate	Discriminate	Evaluate	Invent
Recall	Interpret	Manipulate	Distinguish	Judge	Make
Recognize	Paraphrase	Modify	Examine	Justify	Plan
Retrieve	Report	Operate	Integrate	Support	
Select	Summarize	Perform	Organize	Test	
State	Translate	Produce	Outline	Value	
		Solve	Structure	Verify	
		Use			
		Write			

ACM CCECC Curricular Guidance

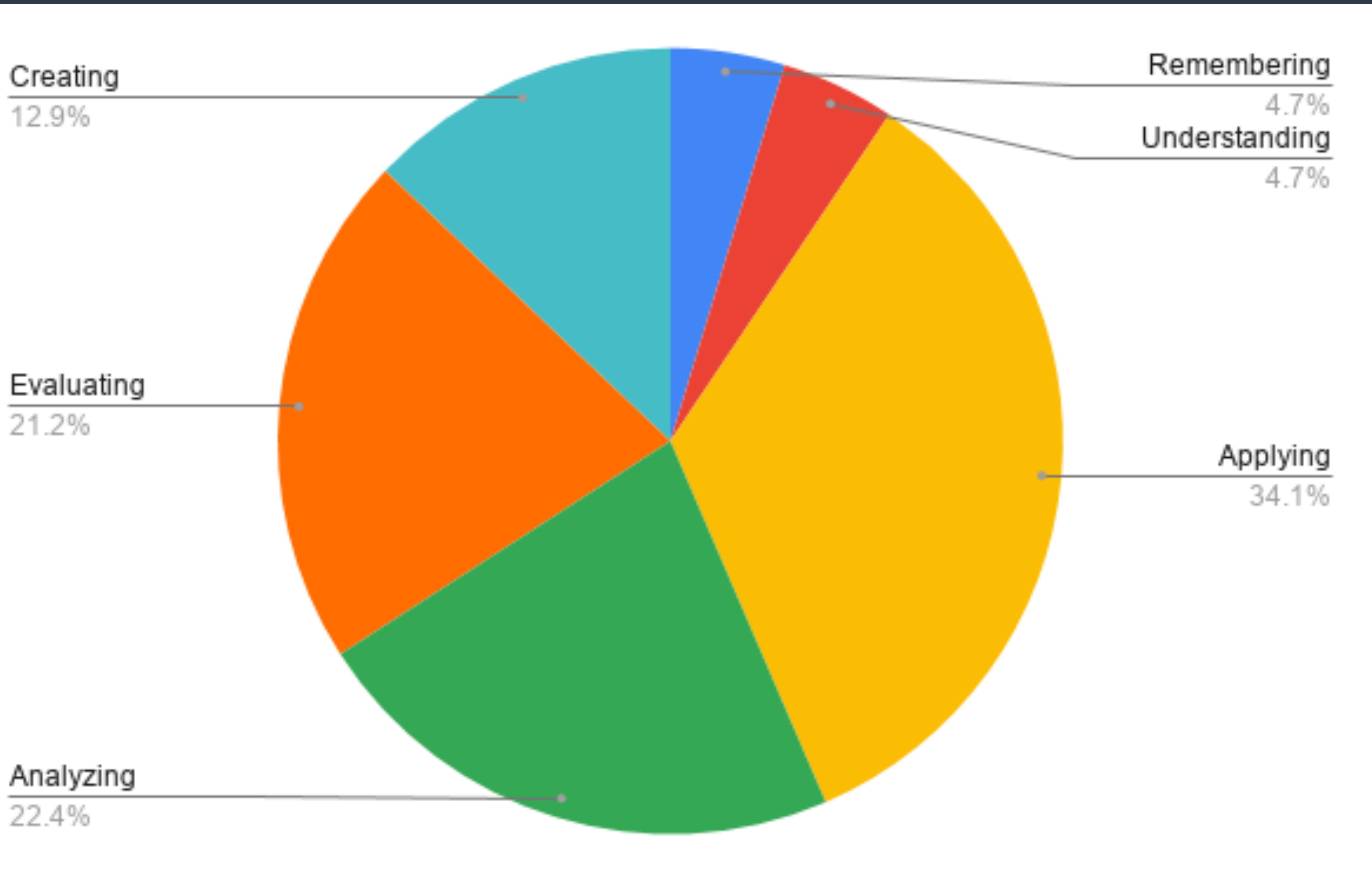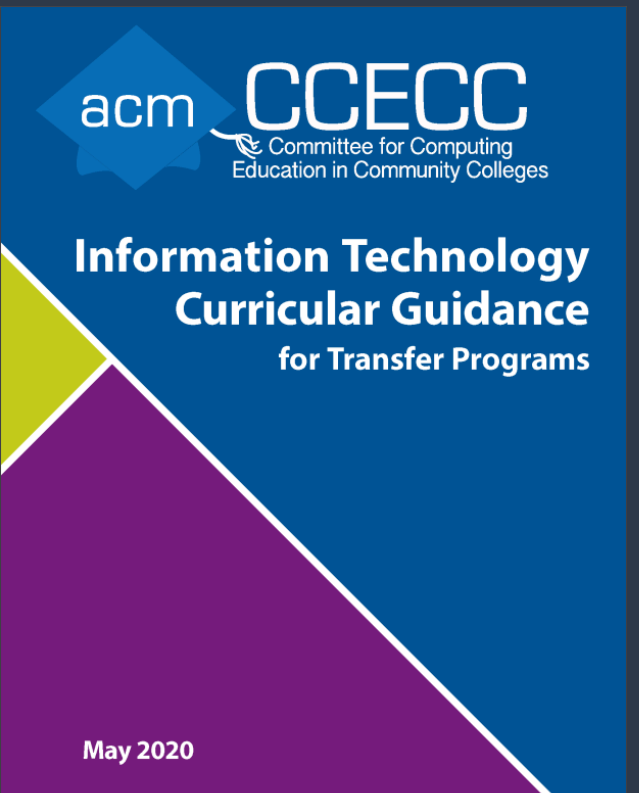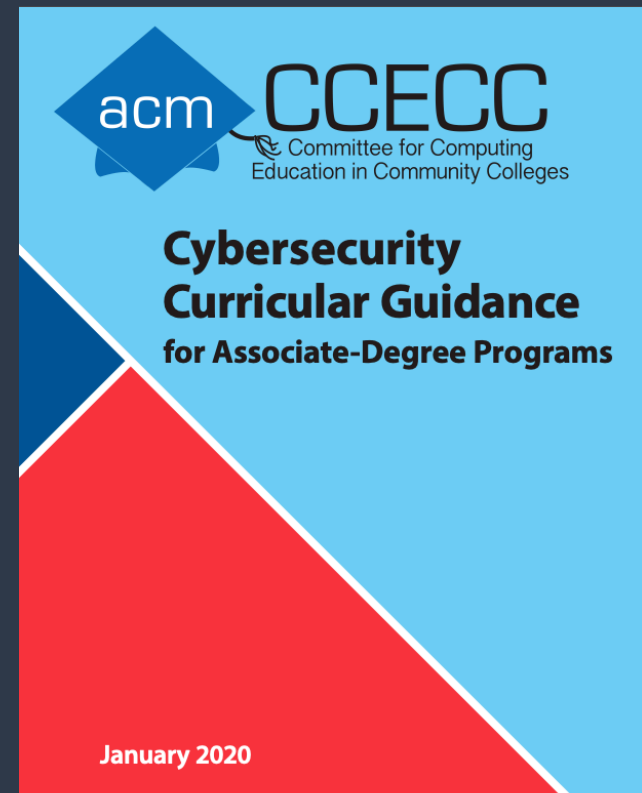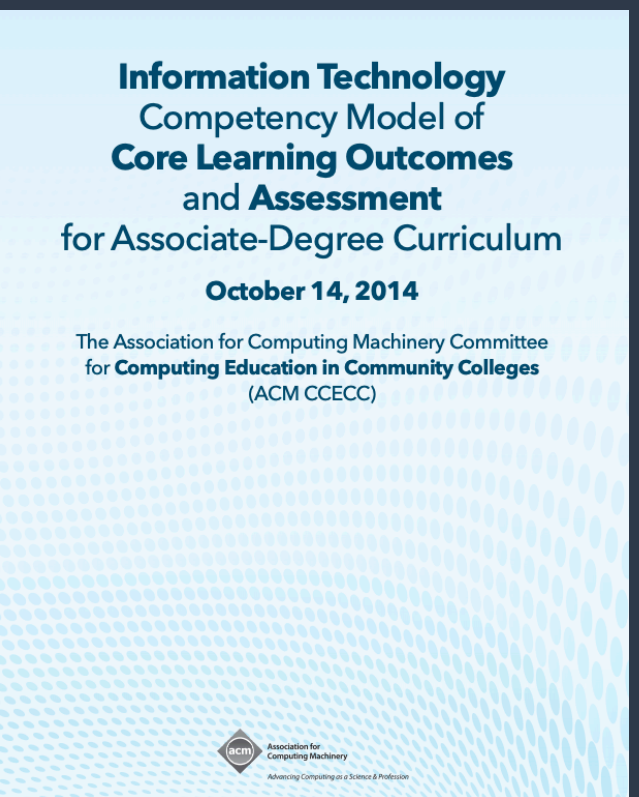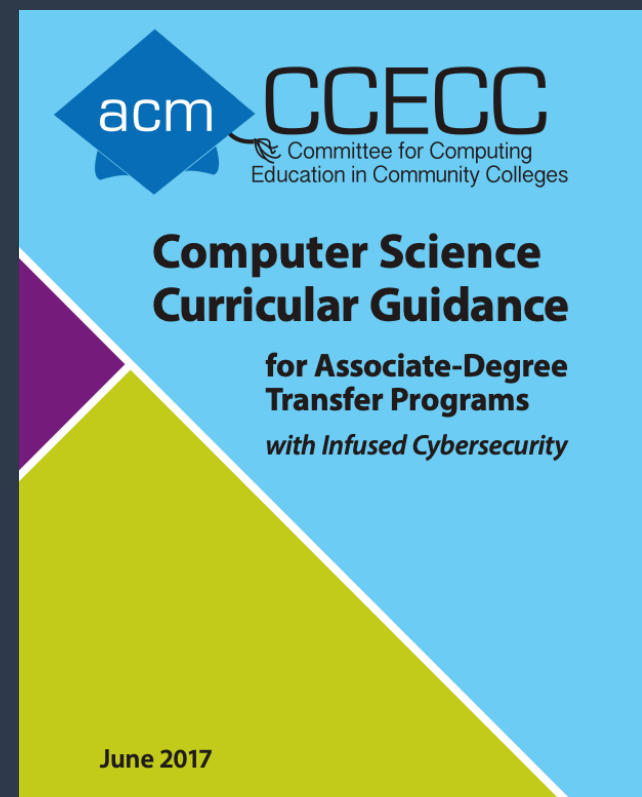## Curricular Guidance Cognitive Domains Distribution

Technical Proposed Verbs

Technical Proposed Verbs

Remembering	Understanding	Applying		Analyzing	Evaluating	Creating
Cite	Annotate	Backup *	Hash *	Articulate	Abstract *	Code *
Enumerate	Comment *	Build	Install *	Automate	Adapt	Collaborate
Quote	Follow	Chart	Interview	Breakdown	Administer *	Compose
Repeat	Rephrase	Compile *	Iterate *	Contextualize	Balance	Generate
		Compute	Measure	Correlate	Debug *	Program *
		Configure *	Patch *	Detect	Decide	Propose
		Connect *	Randomize *	Facilitate	Defend *	Reengineer
		Decrypt *	Recover *	Generalize	Delegate	Refactor *
		Delete *	Relate	Integrate	Derive	Script *
		Deploy *	Restore *	Maintain *	Experiment	Secure *
		Document	Schedule	Model	Hack *	Visualize
		Encourage	Store *	Monitor *	Moderate	
			Teach	Parallelize *	Optimize	
	Experiment	Test *	Predict	Prioritize		
		Virtualize	Promote	Protect *		
			Simulate *	Prove *		
			Transform	Reflect		
			Translate	Validate		
			Update			

Learning Outcomes Examples

Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Repeat a pre-test loop into a post-test loops	**Rephrase** an iterative-based method into a recursive-based one	**Hash** a password using an appropriate hash function; Hash data into a hash table	**Parallelize** a given algorithm/program.	**Hack** a client's computer network to determine its resiliency against denial-of-service attacks	**Visualize** a data model using well-known libraries for data analysis.

Remembering		Applying	Analyzing	Evaluating	Creating
Repeat a pre-test loop into a post-test loops		**Hash** a password using an appropriate hash function; Hash data into a hash table	**Parallelize** a given algorithm/program.	**Hack** a client's computer network to determine its resiliency against denial-of-service attacks	**Visualize** a da using well-kno libraries for da analysis.