

School District of Loyal

Advanced 3D Printing

Grade: 10-12

Student Learning Targets



Students who demonstrate understanding can:

WI State Standards	Standard:	Student Learning Targets:
TE.ENG.2 TE.ENG.6.A BIT.IT.1	Students will apply advanced parametric CAD techniques to create accurate, editable, and manufacturable models and assemblies.	Students will be able to: • Use fully constrained sketches, parameters, dimensions, reference geometry, and construction features in Fusion to create precise models. • Apply advanced modeling tools such as patterns, lofts, sweeps, shells, fillets, chamfers, and combines to solve design challenges. • Organize components and use joints or motion studies to develop and evaluate assemblies before printing. • Revise CAD models for manufacturability by considering orientation, overhangs, strength, material, supports, and printer limitations.
TE.ENG.6.E BIT.IT.1 BIT.EN.2.B	Students will use advanced slicing strategies to optimize print quality, strength, efficiency, and production cost.	Students will be able to: • Select and justify model orientation, layer height, wall loops, top and bottom layers, infill type and density, speed, and cooling settings in Bambu Studio. • Use advanced tools such as variable layer height, modifier meshes, per-object settings, support interfaces, and custom support placement. • Analyze sliced previews to identify seams, overhangs, travel paths, support needs, weak areas, and potential print failures before production. • Compare print time, filament use, strength, surface quality, and cost to select settings that best meet project criteria and constraints.
TE.ENG.6.E BIT.IT.1	Students will select materials, calibrate equipment, maintain printers, and troubleshoot advanced additive manufacturing problems.	Students will be able to: • Compare approved filament types and select materials based on strength, flexibility, heat resistance, appearance, and project requirements. • Select appropriate build plates, nozzle sizes, temperatures, and printer profiles for the model, filament, and desired outcome. • Perform routine calibration, cleaning, maintenance, filament storage, and safe operating procedures on Bambu Lab printers and related equipment. • Diagnose and correct adhesion problems, warping, stringing, layer shifts, support failures, dimensional errors, and extrusion-quality issues.

TE.ENG.6.E BIT.IT.1 BIT.EN.2.B	Students will design and produce multi-color and multi-part prints using efficient manufacturing and assembly strategies.	Students will be able to: • Prepare multi-color models by assigning filaments, painting surfaces, separating bodies, or designing color changes within Fusion and Bambu Studio. • Configure AMS or manual filament changes while evaluating purge volume, transition quality, prime towers, waste, time, and material cost. • Determine when a design should be printed as one object or separated into multiple parts based on color, orientation, supports, strength, and assembly. • Evaluate color alignment, surface quality, dimensional accuracy, and production efficiency, then revise the model or slicing strategy as needed.
TE.ENG.2 TE.ENG.6.A TE.ENG.6.E	Students will design, manufacture, and assemble functional components that fit together and operate as intended.	Students will be able to: • Apply tolerances and clearances using measurements, calibration models, and test coupons to create reliable fits between printed parts. • Design and evaluate press-fit, snap-fit, threaded, pinned, hinged, geared, or fastened connections appropriate to a project. • Select and use suitable fasteners, inserts, adhesives, finishing methods, and assembly procedures while protecting printed components. • Test assemblies for alignment, movement, load, strength, durability, and serviceability, then revise the design using collected evidence.
TE.ENG.2 TE.ENG.6.A BIT.EN.4 BIT.BC.1.C	Students will integrate CAD, additive manufacturing, electronics, and engineering design to construct, test, and communicate a functional drone system.	Students will be able to: • Identify the functions and relationships of a drone frame, motors, propellers, electronic speed controllers, flight controller, receiver, battery, wiring, and protective components. • Design and manufacture a drone frame, mounts, guards, enclosures, or related components that meet defined weight, strength, fit, balance, and safety constraints. • Interpret wiring diagrams and safely assemble, connect, inspect, and test electronic components using approved tools and procedures. • Document the design process, bill of materials, costs, test results, troubleshooting, revisions, and final performance, then communicate the completed solution using digital tools.